

SCIENTIFIC RESULTS OF EXPLORATIONS BY THE U. S. FISH COM-  
MISSION STEAMER ALBATROSS.

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NO. XII.—A PRELIMINARY REPORT ON THE FISHES COLLECTED BY THE  
STEAMER ALBATROSS ON THE PACIFIC COAST OF NORTH AMERICA  
DURING THE YEAR 1889, WITH DESCRIPTIONS OF TWELVE NEW GENERA  
AND NINETY-TWO NEW SPECIES.

BY

CHARLES H. GILBERT,

*Professor of Zoology, University of Indiana.*

The investigations of the *Albatross* during the year 1889 extended over the following regions :

- (1). The coast of California south of Point Conception, together with the outlying islands (stations 2891 to 2982).
- (2). The Revillagigedo Islands, Clarion, Socorro, and San Benedicto (stations 2991 to 2995).
- (3). The Gulf of California and the western coast of Lower California (stations 2996 to 3045).
- (4). The coasts of Oregon and Washington (stations 3046 to 3076).

The shore-fishes of California, Oregon, and Washington were already well known, and the new discoveries from these regions were almost wholly from greater depths than 50 (from 50 to 1000) fathoms.

From the Revillagigedos not more than a dozen species in all had been previously recorded. Of the sixty obtained from shallow water during our short stay not more than half are yet known from the neighboring mainland, the other half, including, together with new forms, a number of strays from the islands of the Western Pacific and from the Galapagos.

The collections from the Gulf of California were obtained mainly along the shores and in the shallower waters of its northern portion; the deeper waters of the Gulf having a bottom of blue mud singularly barren of life.

The present paper deals only with the new forms obtained on the cruise, and will be followed by a more extended report.

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The following genera and species are here described as new:

1. *Myctophum nannoichir*.
2. *Myctophum mexicanum*.
3. *Myctophum protoculus*.
4. *Bathytroctes stomias*.
5. *Idiacanthus antrostomus*.
6. *Bathylagus pacificus*.
7. *Synodus lacertinus*.
8. *Etrumeus acuminatus*.
9. *Argentina sialis*.  
*Leuroglossus* gen. nov. (Argentinidae).
10. *Leuroglossus stilbius*.
11. *Neoconger verniformis*.
12. *Ophichthys nothochir*.
13. *Exocoetus xenopterus*.
14. *Melanphaës lugubris*.
15. *Melanphaës cristiceps*.
16. *Serranus aquideus*.
17. *Pronotogrammus eos*.
18. *Micropogon megalops*.
19. *Cynoscion macdonaldi*.
20. *Pseudojulis adustus*.
21. *Pseudojulis melauotis*.
22. *Pseudojulis inornatus*.
23. *Halichæres sellifer*.
24. *Thalassoma virens*.
25. *Thalassoma grammaticum*.
26. *Thalassoma socorroense*.  
*Calotomus* gen. nov. (Labridæ).
27. *Calotomus xenodon*.
28. *Microspathodon cinereus*.
29. *Holacanthus clarionensis*.
30. *Gobius zebra*.
31. *Gobius dalli*.
32. *Microgobius cyclolepis*.
33. *Sebastichthys* [goodei Eigenmann].
34. *Sebastichthys alutus*.
35. *Sebastichthys rupestris*.
36. *Sebastichthys zacentrus*.
37. *Sebastichthys saxicola*.
38. *Sebastichthys diploproa*.
39. *Sebastichthys aurora*.
40. *Sebastichthys introniger*.
41. *Sebastichthys sinensis*.
42. *Scorpena sierra*.
43. *Icelinus cavifrons*.
44. *Icelinus filamentosus*.
45. *Icelinus tenuis*.
46. *Icelinus fimbriatus*.
47. *Icelinus oculatus*.  
*Radulinus* gen. nov. (Cottidae).
48. *Radulinus asprellus*.  
*Bathyagonus* gen. nov. (Agonidae).
49. *Bathyagonus nigripinnis*.  
*Xenochirus* gen. nov. (Agonidae).
50. *Xenochirus triacanthus*.
51. *Xenochirus pentacanthus*.
52. *Xenochirus latifrons*.
53. *Paraliparis rosaceus*.
54. *Gobiesox pinniger*.
55. *Gobiesox funebris*.
56. *Gobiesox humeralis*.
57. *Gobiesox eigenmanni*.
58. *Gobiesox papillifer*.
59. *Bathymaster hypoplectus*.  
*Gillellus* gen. nov. (Leptoscopidae).
60. *Gillellus semicinctus*.
61. *Gillellus arenicolus*.
62. *Dactyloscopus lunaticus*.
63. *Labrosomus crennobates*.  
*Cryptotrema* gen. nov. (Blenniidae).
64. *Cryptotrema corallinum*.  
*Plectobranchnus* gen. nov. (Blenniidae).
65. *Plectobranchnus evides*.  
*Lucioblennius* gen. nov. (Blenniidae).
66. *Lucioblennius alepidotus*.
67. *Lycodes porifer*.
68. *Lycodopsis crotalinus*.
69. *Lycodopsis crassilabris*.  
*Aprodon* gen. nov. (Lycodidae).
70. *Aprodon corteziannus*.  
*Lycodapus* gen. nov. (Lycodidae).
71. *Lycodapus fierasfer*.
72. *Leptophidium pardale*.
73. *Leptophidium microlepis*.
74. *Leptophidium stigmatistium*.
75. *Leptophidium emmelas*.
76. *Ophidium galeoides*.
77. *Catetyx rubrirostris*.
78. *Neobythites stelliferoides*.
79. *Physiculus rastrelliger*.
80. *Physiculus nematopus*.
81. *Macrurus scaphopsis*.
82. *Macrurus stelgidolepis*.
83. *Macrurus liolepis*.
84. *Platophrys tæniopterus*.
85. *Citharichthys xanthostigma*.
86. *Citharichthys fragilis*.
87. *Aneylosetta dendritica*.
88. *Hippoglossina bollmani*.  
*Lioglossina* gen. nov. (Pleuronectidae).
89. *Lioglossina tetrophthalmus*.
90. *Cynicoglossus bathybius*.
91. *Halientea spongiosa*.
92. *Melchthys bispinosus*.

1. *Myctophum nannochir* sp. nov.

Closely resembling *M. engraulis* in appearance, differing in the posterior insertion of both rayed and adipose dorsal, and in the color.

Head  $3\frac{1}{2}$  to  $3\frac{3}{8}$  in length; depth 5.

Eye large, longer than snout, 4 in head in young (3 inches long),  $4\frac{1}{2}$  in head in adults (5 inches long). Interorbital space wide,  $3\frac{2}{3}$  in head, the ethmoidal ridge prominent, continuous backwards with the low ridge on middle of occiput. Supraocular ridge prominent, expanded.

Lower jaw included, the tip of mandible slightly projecting. Mouth rather large, the maxillary not reaching the anterior margin of preopercle,  $1\frac{1}{2}$  in head. Maxillary slightly expanded at tip, its width less than half diameter of pupil. Gill-rakers long and slender, 5 by 18 on outer arch.

Origin of dorsal nearer posterior margin of orbit than adipose fin, its base a trifle less than half head, the vent under its middle. Adipose fin wholly behind base of anal, which is contained  $1\frac{2}{3}$  in length of head. Pectorals very short and narrow, with about nine rays, not reaching base of ventrals and less than one-third head. Ventrals inserted well in advance of dorsal, their distance from tip of snout  $2\frac{1}{3}$  in length of body.

D. 12 or 13; A. 15 or 16. Lat. l. 35 or 36.

Scales large, entire.

*Color*: Grayish or blackish, the opercle jet-black. Caudal black at base, the fins otherwise more or less dusky (translucent in the young); a light area usually present on middle of ventrals. Commencing on branchiostegal membranes, the phosphorescent spots are arranged in two series near median ventral line, extending back to base of caudal. Four pairs of spots in advance of ventral, seven pairs between ventrals and anal, the series diverging posteriorly and terminating in a spot above front of anal and immediately below lateral line. The series begins again at front of anal, along base of which are six or seven pairs of spots; seven pairs along tail and four at base of lower caudal lobe. A spot at angle of preopercle, three just behind shoulder girdle, and four on sides midway between lateral line and ventral outline.

No glandular spot in front of eye; a large one occupying back of tail and one below.

Very abundant along the entire Pacific coast of the United States. Specimens were secured at Stations 2925, 2948, 3071, and 3072, in from 266 to 685 fathoms.

2. *Myctophum mexicanum* sp. nov.

Body slender, the eye rather small, the snout comparatively acute.

Depth,  $5\frac{3}{4}$  in length; head,  $3\frac{1}{2}$ . Eye longer than snout, 4 to  $4\frac{1}{3}$  in head; snout,  $6\frac{1}{2}$ ; interorbital width, 5.

Ethmoidal ridge low, ending above middle of eye; a shallow depression behind it on occiput, the latter without ridge and not con-

spicuously arched. Upper outline of snout gently rounded, not projecting beyond mouth, the jaws equal. Maxillary slightly dilated at tip, not reaching preopercle,  $1\frac{2}{5}$  in head; gill-rakers, 5 + 10.

Front of dorsal midway between tip of snout and base of caudal, the vent under middle of dorsal base. Adipose dorsal inserted over last anal ray. Ventrals reaching vent, inserted well in advance of dorsal, equidistant between front of orbit and last anal ray. Pectorals minute, of three or four rays only, their length scarcely half diameter of orbit (possibly somewhat mutilated).

D. 12; A. 14. Lat. l. 30 to 33.

No phosphorescent spot in front of eye. A small glandular streak on back of tail and below. Spots arranged as follows: Three pairs on branchiostegal membranes, one on preopercle above its angle; four pairs behind shoulder girdle, the upper one on lateral line, the lower pair on breast; three other pairs on breast and another higher up on sides; six pairs between ventrals and front of anal, three of these near median line, the other three higher up on sides; six pairs along anal fin, the series here diverging posteriorly, the last pair on lateral line; six pairs of spots along under side of tail, and three along base of lower caudal lobe. This species has four pairs of spots located on the lateral line and separated by about equal distances. The general color is brownish, the opercles steely or blue-black, the base of caudal black, and an intense black bar on gular membrane immediately behind symphysis.

Six specimens, the largest 2 inches long, from Stations 3008 and 3009, in from 306 to 857 fathoms.

### 3. *Myctophum protoculus* sp. nov.

D. 12; A. 13 or 14. Lat. l. 35 L.  $2\frac{3}{4}$  in.

Eye very large, placed anteriorly and superiorly, the snout very bluntly rounded, projecting but little beyond the eye; length of snout about one-third diameter of orbit. Body rather deep, its depth 4 in length; head  $3\frac{1}{2}$ . Depth of head  $1\frac{1}{3}$  in its length. Occipital region very convexly arched, without median crest. Interorbital space flat-tish, divided anteriorly by the very high ethmoidal ridge, posteriorly by the forward continuation of the occipital arch.

Lower jaw included, the maxillary not expanded behind,  $1\frac{1}{2}$  in head. Rami of lower jaw expanded, meeting along median line to form a raised crest. Gill rakers long and slender, thirteen on horizontal limb of anterior arch.

Front of dorsal nearer tip of snout than base of caudal by a distance varying from a diameter of orbit to one-half that length. Length of dorsal base  $1\frac{4}{5}$  in head. Front of anal midway between base of median caudal rays and base of pectorals. Ventrals inserted slightly in advance of front of dorsal, the fin reaching front of anal. Pectorals very

slender, with about ten rays, not reaching beyond base of ventrals, one-half head. Adipose dorsal slightly behind last anal ray.

Scales all lost.

*Color*: Blackish, iris bright silvery. A conspicuous silvery (phosphorescent) spot in front of eye above nostril. A glandular white spot above each pectoral. No glandular masses on back or under side of caudal peduncle. Three pairs of spots on gill membranes, visible through the mandible; a series of four on each side following curve of shoulder girdle; two pairs on breast; a pair on base of ventrals more widely separated than those preceding; four pairs on belly, the lines then diverging and extending nearly to lateral line, each containing three spots; a pair on sides above base of ventrals, and one above middle of abdomen; five pairs along base of anal, the series slightly diverging posteriorly and terminating in a sixth pair higher up on sides; five or six pairs along under side of tail and three or four along base of lower caudal lobe.

Three specimens from station 3072, in 584 fathoms.

#### 4. *Bathytroctes stomias* sp. nov.

Differing from all species described in its very large mouth, the front of eye being over the middle of upper jaw.

Body slender, the greatest depth at vertical of base of pectorals  $5\frac{2}{3}$  in length. Depth of caudal peduncle one-half greatest depth; head  $3\frac{2}{7}$  in length.

Premaxillaries expanded anteriorly to form a triangular projection resembling that of *Labidesthes*, and overlapping the lower jaw. Mouth very large, the maxillary extending far behind the eye, its length nearly equalling the depth of body,  $1\frac{3}{4}$  in head. Eye small,  $6\frac{1}{4}$  in head; snout  $3\frac{2}{3}$ ; interorbital width,  $5\frac{1}{4}$ .

Teeth in jaws small, close-set, incurved, depressible, none of them enlarged; those in mandible in a wide band, in premaxillaries or maxillaries in a narrow band or a single irregular series. Teeth on vomer and palatines larger than those in jaws, in a single series. The palatines form a conspicuous projecting ridge on each side of roof of mouth.

Top of head with a conspicuous deep lengthwise groove extending from nape forward to snout and half as wide as interorbital space. A large mucous canal, which runs along its rim posteriorly, opens above orbit. Gill rakers long and slender, the longest over two-thirds diameter of orbit, 5 + 13 in number.

Dorsal beginning in advance of vent, the distance of its origin from base of caudal equaling one-third length. The length of its base equals its distance from rudimentary caudal rays, or about one-half head. Origin of anal slightly behind middle of dorsal, the length of its base  $2\frac{2}{3}$  in head. Ventrals posteriorly inserted, their base twice as far distant from pectorals as from front of anal. Caudal forked, with many rudi-

mentary rays above and below. The paired fins are so mutilated that nothing can be learned as to their shape or length.

Scales large, nine in a series from ventrals forward to lateral line. Lat. 1. 57; D. III, 17; A. II, 14; V. 8; P. 9.

*Color*: Dark brownish, the fins blackish, head, mouth, gill-cavity, and peritoneum jet-black.

One specimen, 13 inches long, from station 3074, in 877 fathoms.

#### 5. *Idiacanthus antrostomus* sp. nov.

Abdomen much dilated, abruptly constricted immediately behind the ventral fins, and much narrowed also anteriorly, the depth again increasing to occiput. Greatest depth immediately in front of ventrals, one-sixteenth of the total length; head one-twelfth. Maxillary reaching edge of gill cover.

Teeth in a single series in each jaw, readily depressible, varying greatly in length. The teeth in the upper jaw are evidently arranged in groups of four or five, the anterior member of each group being very short, the others rapidly increasing backwards, the posterior tooth very long. In the mandible the lateral teeth are inserted at the extreme outer edge of the jaw, but the anterior teeth are inserted farther inward; thus the last of the anterior teeth are distinctly within the first of those on sides of jaw. A single small tooth on each side of vomer, and two or three posteriorly on palatines. Three pairs of teeth directed backwards from near tip of tongue.

Eye over first third of length of maxillary. Lower jaw much longer than the upper. Barbel one-third longer than the head, expanded near its tip, and again narrowed as in *I. ferox*.

Dorsal beginning well in advance of ventrals, its distance from tip of snout  $3\frac{1}{2}$  in total length. The anterior rays are distant, the membrane from one ray reaching only to basal portion of the succeeding ray. Each ray starts behind a pair of short spinous projections which diverge backwards, the fin when depressed lying in the groove formed by these diverging pairs of spines. Caudal forked, the rudimentary rays extending well forwards on caudal peduncle, nearly meeting posterior rays of dorsal and anal. Vent immediately in front of anal fin, far behind the dilated abdomen, its distance from end of caudal  $3\frac{1}{2}$  in total length. The anal is similar to dorsal. Ventrals about three-fourths length of maxillary, very slender, composed apparently of five or six slender rays. They are inserted much nearer front of anal than head, the former distance about half their distance from tip of snout.

D. 57; A. ca. 35.

*Color*: Black, the mandible lighter, the base and terminal portion of barbel and the caudal translucent. No evident phosphorescent spot on cheek. Four series of minute phosphorescent dots on abdomen, the lateral series extending but a short distance behind ventrals, the median series uniting to form a single row behind these fins.

A single specimen,  $4\frac{1}{2}$  inches long, from station 2980, in 603 fathoms.

6. *Bathylagus pacificus* sp. nov.

This species differs from *B. antarcticus* and *B. atlanticus* in the narrow channeled interorbital space and the slenderer body.

Anterior profile not decurved, the premaxillaries anteriorly on level of middle of eye.

Depth  $1\frac{2}{3}$  in head and about  $6\frac{2}{3}$  in the length; head 4. Eye  $2\frac{1}{4}$  in head; snout short, less than half eye; interorbital space narrow, deeply grooved, one-third diameter of orbit.

Lower jaw with a series of small teeth, the very weak premaxillaries toothless; a strong series of teeth on vomer and palatines.

Front of dorsal midway between adipose dorsal and front of snout. Ventrals inserted under posterior end of dorsal. Anal inserted far back, the vent immediately in front, the length of tail equaling that of head.

D. 8 or 9; A. 16; P. 9. Lat. l. 40.

Scales lost; about forty in lateral line, judging from impressions on the skin.

*Color*: Head, lining of mouth and gill cavity, and peritoneum, jet black. Fins blackish. In its present condition the general color of the sides is black; margins of scale-pouches black. The fish was probably wholly black in life.

Two specimens, taken off the coast of Washington, at stations 3071 and 3074, in 685 and 877 fathoms.

7. *Synodus lacertinus* sp. nov.

With short snout, small scales, short pectorals and anal, and low dorsal.

Head,  $3\frac{4}{5}$  in length; depth,  $5\frac{2}{3}$ . D. 11; A. 8. Lat. l. 68.

Snout,  $4\frac{1}{3}$  in head,  $2\frac{3}{4}$  in maxillary, its length slightly less than its width at base. Eye over middle of premaxillary, which is  $1\frac{3}{4}$  in head; eye, 6. Interorbital width half snout. Occiput with well-developed rugosities.

Scales on cheeks crowded, in six rows. Four series between adipose fin and lateral line.

Front of dorsal nearer tip of snout than adipose fin by a distance equaling diameter of pupil. The fin is low, the tips of anterior rays barely reaching base of posterior ray in reflexed fin. Base of dorsal  $1\frac{7}{10}$  in head. Upper outline of dorsal convex. Anal very small, its base one-third length of head. Pectorals very short, bluntly rounded, the longest ray  $2\frac{1}{2}$  in head, not reaching beyond vertical from base of ventrals. Ventrals reaching half way to front anal,  $1\frac{1}{7}$  in head.

*Color*: Black, with five broad dark bars reaching to lateral line or below. The middle of each interspace with a fainter bar confined to back. Mandible below with alternating brown and silvery cross-bars. A black spot at lower angle of cheeks, with a small silvery blotch be-

low it. Inside of mouth and gill cavity not dark. Dorsal and caudal with traces of faint dark bars.

One specimen,  $6\frac{1}{4}$  inches long, from Acapulco, Mexico.

### 8. *Etrumeus acuminatus* sp. nov.

Differing from *E. micropus* and *E. sadina* in the much smaller eye, the longer, more acuminate snout, and the posterior dorsal.

Body slender, the belly rounded, the depth 6 in length; head,  $3\frac{1}{2}$ . Eye small,  $1\frac{2}{3}$  in snout,  $4\frac{1}{3}$  in head. Maxillary scarcely reaching vertical from front of orbit, about as long as snout, 3 in head. Teeth evident in both jaws and along sides of maxillary and on vomer and palatines.

D. 16 or 17; A. 10 or 11.

Front of dorsal nearer base of caudal than tip of snout (nearer snout in other species). Ventrals inserted behind the dorsal, slightly nearer base of caudal than base of pectorals.

Scales small, in about sixty transverse rows, judging from the impressions on the skin.

*Color*: Translucent, a faint trace only of a narrow lateral silvery streak, above which is a line composed of coarse black specks. Sides of head silvery, with little or no black specking. Mandible and occiput dusky. More or less black specking along base of vertical fins, and a narrow black behind the anal.

Six specimens of this species were secured in the Gulf of California, at station 3012 (22 fathoms), and in San Luis Gonzales Bay, the largest specimens  $1\frac{1}{2}$  inches long.

### 9. *Argentina sialis* sp. nov.

Resembling *A. elongata*, but with a much deeper body, and a larger eye.

Head 3 inches in length; depth  $5\frac{1}{2}$ . D. 11; A. 12.

Length of maxillary from tip of snout 4 in head,  $1\frac{2}{3}$  in snout. Snout but little longer than eye,  $3\frac{1}{6}$  in head; eye  $3\frac{1}{2}$ ; interorbital width 4.

Upper jaw with a narrow band of small teeth borne on the vomer and the front of the palatines, not on the very narrow weak premaxillaries. Lower jaw toothless. Edge of tongue with a series of strong, backwardly-curved teeth, six or eight in number. Gill rakers numerous, slender, rather short, about twenty-five in number below angle of arch.

Front of dorsal fin nearer tip of snout than base of caudal by a distance equaling diameter of pupil. Ventrals inserted behind middle of dorsal, midway between base of caudal and front of orbit, extending but little more than half way to front of anal. Caudal forked.

Scales not spinous, the margins entire, a few only preserved along sides of tail. There were forty or forty-five in a longitudinal series.



*Color*: Iris, a streak along sides, and sides of head, silvery. Occiput and snout dusky; a black blotch above each eye. Back with eight faint dusky cross-bars. Fins somewhat dusky. Mouth and gill cavity white. Peritoneum black.

A single specimen 3 inches long, from station 3017, in 58 fathoms.

**Leuroglossus** gen. nov. (*Argentinidae*.)

Ventrals nearly under middle of dorsal. Mandible with a few weak teeth or none. Premaxillaries toothless. A row of stronger teeth on vomer and front of palatines. Tongue, toothless. Pyloric cæca 9.

Appearance of *Argentina*, but the snout shorter, the maxillary reaching front of eye, and the tongue toothless. (Type, *Leuroglossus stilbius* sp. nov.)

10. *Leuroglossus stilbius* sp. nov.

Body compressed, of moderate depth. Head 3 in length; depth  $5\frac{1}{3}$ . D. 10; A. 11.

Eye  $3\frac{1}{2}$  in head, equaling maxillary, which reaches front of orbit. Snout  $3\frac{3}{4}$  in head; interorbital width  $4\frac{1}{2}$ . Lower jaw projecting. Gill rakers long and numerous. Opercle very thin, membranous. Front of dorsal midway between base of caudal and front of pupil. Ventrals inserted nearly under middle of dorsal, midway between base of caudal and preopercular margin. Front of anal midway between base of caudal and base of ventrals.

The character of the scales can not be determined, as they are wholly lacking in the two specimens obtained.

*Color*: Sides of head, body, and abdomen right silvery; dorsal region dusted with fine black dots, which become coarser on tail. Snout blue-black. Opercle with steely luster. Upper part of eyeball black. Buccal and gill cavities, and peritoneum jet-black. Fins dusky.

Two specimens, the largest 3 inches long, from stations 2997 and 2998, in 221 and 40 fathoms.

11. *Neoconger vermiformis* sp. nov.

Body slender, the depth  $2\frac{1}{2}$  in length of head. Head  $4\frac{1}{2}$  in length of body. Snout anteriorly sharp, slightly projecting beyond the mouth. Mouth small, reaching slightly behind orbit, its cleft  $3\frac{1}{2}$  in head. Eye very small, about 9 in head. Posterior nostril immediately in front of middle of eye, the anterior near tip of snout, both without tubes.

Teeth small, conical, in a single row in jaws and on vomer posteriorly; anteriorly on vomer in two series. Gill slits vertical, longer than eye, the two separated by an interspace nearly equal to their length. Tail usually longer than body by a distance equaling length of caudal rays, the body rarely slightly longer than tail.

Dorsal beginning in advance of vent by a distance equaling half length of head. Both dorsal and anal are low anteriorly, but evident,

increasing in height posteriorly, and meeting around end of tail in a well-developed fin. Pectorals well developed,  $3\frac{1}{2}$  in head.

Color uniform, yellowish-olive on body and fins, finely dotted with black.

Several specimens taken at station 3035 (30 fathoms); the longest 6 inches.

This species seems to be nearly related to *Leptoconger perlongus* Poey, which has, however, the dorsal beginning much nearer the head, and the anterior nostril tubular.

#### 12. *Ophichthys nothochir* sp. nov.

Closely related to *O. evionthas*, differing chiefly in the obsolescent pectoral fins and in the color, *evionthas* being finely spotted.

Teeth conical, compressed, directed backwards in a single series in jaws and on vomer, smaller in size on the latter; "nasal teeth" in a V-shaped series.

Mouth small, its cleft extending but little behind the eye, its length  $2\frac{1}{4}$  in head. Anterior nostrils in a well-developed tube without projecting flap. Posterior nostrils without tube, their posterior end under front of orbit.

Snout 4 in head, the upper jaw projecting for a distance equaling two-thirds the diameter of orbit. Eye half length of snout, its anterior margin over middle of cleft of mouth. Gill slit  $6\frac{1}{2}$  in head.

Pectorals nearly obsolete, represented by a small triangular, apparently rayless flap, less than one-third diameter of orbit, and one-fourth gill slit.

Origin of dorsal behind gill slit a distance equaling half that from gill slit to front of eye.

Head and trunk longer than tail by a distance about equaling length of snout. Head  $4\frac{1}{3}$  in trunk.

*Color*: Middle line of back with a series of twelve elliptical yellow spots, their length varying from once to twice the diameter of eye, and separated by wide intervals; each spot is surrounded by a black ring, coalescent below with a large elliptical black blotch on middle of sides, these varying somewhat in size and shape. The intervals between these spots are marked with round black spots about the size of pupil. Similar spots, but larger, are scattered on sides of belly and under side of tail; middle of belly with fainter spots and markings. Head closely covered with round or polygonal black spots about as large as eye, around which are reticulations of light yellow.

Several specimens from San Josef Island, Gulf of California; the largest 14 inches long.

#### 13. *Exocætus xenopterus* sp. nov.

**DIAGNOSIS**: Snout short, without barbels. Strong bands of teeth on vomer and palatines. Pectorals elongate, nearly reaching base of cau-

dal, the second ray bifid. Ventrals posteriorly inserted. Anal small. Dorsal not elevated. Pectorals uniform black without white markings. Ventrals white, dorsals dusky. Caudal jet-black on basal portion of both lobes, the terminal third abruptly white.

*Specific description*: Head  $4\frac{1}{5}$  in length; depth 6.

D. 13; A. 10. Lat. 1., about 45.

Snout short,  $3\frac{3}{4}$  in head; mandible scarcely protruding, wide at tip, with a narrow band of small teeth. Teeth along edge of premaxillaries in a single series. Vomer with a narrow patch, palatines with a wide patch of well-developed teeth, similar to those in jaws. No teeth on tongue.

Preorbital about as wide as pupil; distance from tip of snout to end of maxillary equals length of snout. Eye large,  $3\frac{1}{4}$  in head. Interorbital width 3 in head.

Distance from front of dorsal to base of middle of caudal rays equals half its distance from posterior margin of pupil. Length of dorsal base equals two-thirds length of head, the highest ray  $2\frac{2}{3}$  in head.

Origin of anal under middle of dorsal, its base equaling snout and half eye, the last ray nearly under last dorsal ray. Lower lobe of caudal  $3\frac{1}{2}$  in length; the upper slightly less than head. Origin of ventrals half way between base of caudal and preopercular margin, the tip reaching base of third anal ray, a trifle shorter than head.

First pectoral ray five-eighths the longest; second ray deeply forked, the third and fourth apparently the longest (the tips slightly mutilated.) The fin extends beyond dorsal, and falls short of the caudal by a trifle.

*Color in spirits*: Black above, becoming abruptly silvery on middle of sides. Pectorals jet-black within, overlaid by some silvery luster without. Median ventral rays black, the inner and outer white. Dorsal dusky, without distinctive marks. Anal white. Caudal black on basal portion of both lobes, the remaining third white.

A single specimen,  $9\frac{1}{2}$  inches long, in good state of preservation, taken from a booby-bird on Clarion Island.

#### 14. *Melamphaës lugubris* sp. nov.

Head very broad and heavy, the snout extremely broad and short, its anterior profile nearly vertical. Mouth very oblique, the lower jaw protruding beyond the upper, the premaxillaries anteriorly on level of lower margin of pupil, the maxillary reaching vertical from its posterior margin,  $2\frac{2}{3}$  in head; snout  $4\frac{1}{2}$ , its width equaling the length of snout and eye; interorbital width  $2\frac{2}{3}$ ; eye  $6\frac{1}{2}$ .

Teeth minute, uniform, in a single series in upper jaw and in front of mandible, the lower jaw laterally with a narrow band. Vomer and palatines toothless.

Interorbital space strongly convex, as well as rest of head deeply excavated for mucous canals, which are covered with a very delicate integument conspicuously marked with fine parallel or radiating striæ.

The bones are firm and cartilaginous, not papery or with thin membranous expansions as in other related species.

Margins of preopercle entire, the bone firm, the posterior angle scarcely produced, evenly rounded, the margin nearly vertical. No evident ridge on opercle, which terminates posteriorly in a flexible rounded process without spine. Mandibles meeting along median line posteriorly, but not forming a ridge. Gill rakers as long as eye, slender, about 14 below angle.

Dorsal spines very weak, the third half as high as first soft ray. Posterior line of occiput midway between tip of snout and origin of dorsal. Base of dorsal equals length of head behind middle of eye. Anal small, its origin under base of last dorsal ray, the length of its base equaling half interorbital width. Spine slender, about two-thirds longest soft ray. Caudal mutilated, apparently forked. Pectorals long, slender, falcate, with fourteen rays, the longest  $1\frac{2}{3}$  in head. Ventrals not reaching vent, with one spine and seven or eight soft rays, the longest two in head.

Scales large, caducous, with entire edges, covering the opercles but lacking elsewhere on head.

D. III, 15; A. I, 8. Lat. l. 26.

*Color*: Uniform brownish-black, the fins dusky. Mouth, gill-cavity, and peritoneum black.

A single specimen,  $3\frac{1}{2}$  inches long, from Station 2923, in 822 fathoms.

This species resembles very closely *M. typhlops*, as figured by Gunther (Deep-Sea Fishes, Challenger, Pl. V., fig. A). In *typhlops* the mouth is evidently larger, and the species is described as having six dorsal spines and eleven rays, although the artist has represented it with D. III, 14.

I am unable to ascertain to what extent *lugubris* approximates *Plectromus suborbitalis* Gill, as the description of the latter contains nothing of specific value except the number of the fin rays.

#### 15. *Melamphaës cristiceps* sp. nov.

System of mucous canals on head highly developed, their margins raised into high thin crests, usually with undulating margins and more or less serrulated. A rather long, sharp, slender spine, directed upwards and forwards on middle of snout. Two or three spines at lower posterior angle of cheek; marginal portion of preopercle extremely thin and flexible, its lower limb sharply serrated. From the upper anterior angle of opercle two ridges diverge, the one running backwards terminating in a spinous point. Opercular margin serrulate.

Mandibles meeting on median line below, their edges produced to form a conspicuous median crest. Their lateral margins form membranous wings which combine with similar prolongations from the sub-orbital bones to overlap the cleft of the mouth.

Head long,  $2\frac{3}{5}$  in length; depth,  $3\frac{3}{5}$ ; length of caudal peduncle,  $4\frac{1}{5}$ . Greatest depth of caudal peduncle, one-half its length. Head narrower than in *M. lugubris*, its anterior profile descending more gradually. Mouth less oblique, the lower jaw included, the maxillary extending behind eye,  $2\frac{1}{4}$  in head; snout,  $4\frac{1}{3}$ ; interorbital width,  $2\frac{1}{5}$ ; eye,  $7\frac{1}{2}$ .

Teeth minute, equal in a single series in both jaws. Vomer and palatines toothless. Gill-rakers long, broad at base, compressed, weak, about fifteen below angle.

Posterior line of occiput slightly nearer front of dorsal than end of snout; length of fin equaling its distance from base of caudal. Spines slender, pungent, weak. Origin of anal under the fourth from the last ray of dorsal, the length of its base scarcely exceeding length of snout. Anal spines rather strong, the two intimately soldered together, their outlines distinct.

D. III, 13; A. II, 9.

Pectorals long,  $1\frac{1}{3}$  in head. Ventrals I, 7 or I, 8.

The scales are entirely lost; they were, however, large and must have been about twenty-three in number, judging from the impressions on the skin.

*Color*: Black anteriorly, brownish-black behind. Mouth, gill-cavity, and peritoneum jet-black. Fins all blackish.

One specimen 5 inches long, from Station 3075, in 859 fathoms.

#### 16. *Serranus æquidens* sp. nov.

Body slender, the head very long, the caudal peduncle narrow. Tip of lower jaw but little projecting; mouth large, the maxillary reaching vertical from posterior margin of pupil,  $2\frac{1}{3}$  in head. Upper jaw with teeth laterally in a single series, becoming double anteriorly; the outer teeth are larger and spaced but not canine-like; the inner are close set, small, directed inwards; the median pair of teeth of inner series are larger than the others and directed backwards. Teeth of lower jaw in a single series forming a very narrow patch at symphysis. Teeth in a narrow patch on vomer, the posterior enlarged almost canine-like, directed backwards; on palatines in an irregular double series.

Eye large, as long as snout,  $4\frac{1}{2}$  in head. Interorbital space flat, its width three-fifths orbit. Preorbital narrow, one-fourth orbit. Angle of preopercle slightly projecting, the vertical margin gently concave; teeth minute and equal on both limbs and at angle. Opercle greatly produced backwards, reaching much beyond inner edge of shoulder-girdle, the margin of preopercle equidistant between front of eye and end of opercular flap. Opercle with a single spine, the lower not developed. No spine on shoulder.

Gill-rakers long and slender, sixteen in number on anterior limb of arch, the longest one-half the diameter of the large eye.

Dorsal with weak, flexible, low spines, which increase in length the fourth (two-sevenths length of head), then decrease to the ninth, which

is less than one-half the fourth, the tenth again longer. Dorsal rays slender, little forked, the longest less than highest spine. Caudal deeply lunate. Anal short, with slender rays, the margin not rounded, the anterior rays longest, the posterior but little shortened.

Anal spines slender, graduated, the third scarcely two-thirds height of first soft ray.

Ventrals inserted well in advance of base of pectorals, not nearly reaching vent, one-half-head. Pectorals long and narrow, reaching front of anal, with narrow scaly base, the posterior margin obliquely truncate or somewhat *f*-shaped in the spread fin, the lower rays slightly longer than upper, the middle rays shortest.

Scales large, ctenoid, a wide rough area within the spinous margin. Cheeks and opercles scaled, the scales on opercles larger than elsewhere. Top of head scaled as far forward as posterior margin of pupil. Caudal fin scaled at base of lobes. Fins otherwise without scales. Lateral line running high and descending gradually to middle of caudal peduncle.

Head,  $2\frac{1}{2}$  in length; depth,  $3\frac{1}{2}$ ; depth of caudal peduncle equaling diameter of orbit. D. IX, 1, 12; A. III, 7. Lat. l. 48,  $4\frac{1}{2}$  series above it, thirteen between lat. l. and front of anal. Five series of scales on cheeks parallel with posterior margin of orbit.

*Color in spirits*: Dusky-brownish above, lighter below; a series of about seven ill-defined dusky blotches along lateral line, from which still fainter bars run downwards, soon disappearing. Lining of opercle largely black; this apparent as a dusky blotch externally. Vertical fins transparent, minutely punctate with black. Median rays of ventrals black, the outer and inner whitish. Peritoneum silvery-white. No very conspicuous marks on body or fins.

A single specimen about 7 inches long, from Station 2996, in 112 fathoms.

This species belongs to the subgenus *Prionodes*.

#### 17. *Pronotogrammus eos* sp. nov.

**DIAGNOSIS**: Interorbital and maxillary naked, the former concealed. Preopercular margin serrate, other bones of head entire. None of dorsal spines elongated or filamentous. Eye very large. None of the fins greatly produced.

*Specific description*: Body elongate, tapering regularly backwards from shoulder, the lower outline nearly straight; head thick; mouth terminal, oblique, the mandible laterally included, its tip fitting into an emargination of premaxillaries, not entering profile. Maxillary without supplemental bone, broad, reaching vertical from middle of pupil,  $2\frac{1}{3}$  to  $2\frac{1}{2}$  in length.

Teeth in upper jaw in a narrow villiform band, the outer series slightly enlarged, and with one or two strong canines directed forwards and outwards. Teeth in mandible small, in a single series, a pair of

anterior canines directed forwards and outwards, and a second pair on sides of jaw directed backwards and inwards. Teeth in rather broad bands on vomer and palatines; none on tongue.

Interorbital space gently concave, the supraocular ridges slightly elevated, its width but little more than half diameter of orbit. Preorbital narrow, its width above middle of maxillary one-third pupil. Eye very large, 3 in head, much longer than snout.

Vertical limb of preopercle usually with a slight emargination above the angle (in adults), the angle itself and a region above the emargination slightly projecting. Teeth of vertical limb fine, equal; those of angle coarser, those below again fine, directed backwards; notch above angle usually smooth when present. Two flat spines on opercle; other bones of head entire. Gill rakers long, slender, close-set, about thirty on anterior limb of arch, the longest one-half orbit.

Dorsal emarginate; the spines slender, pungent, not flexible, none of them produced or filamentous, each with a short membranous flap behind its tip; spines gradually increasing in height to the sixth, which is contained  $3\frac{1}{2}$  times in head; the tenth is shorter than any other except the first and second, and is two-thirds the sixth. Soft dorsal high, some of the posterior rays highest, not reaching base of caudal, 2 to  $2\frac{1}{2}$  in head.

Anal similar to soft dorsal, its posterior rays in advance of end of dorsal; second anal spine stronger but shorter than third, the length of which is  $3\frac{1}{5}$  in head.

Ventrals inserted slightly in advance of base of pectorals, the outer rays somewhat produced, reaching beyond vent and usually to or slightly beyond front of anal.

Caudal forked, the middle rays two-thirds the length of the outer, which are not produced. Pectorals short, reaching slightly beyond front of anal.

Scales large, ctenoid, on both head and body; on top of head the scales cover occiput and send a V-shaped patch to above middle of orbits; the rest of interorbital space, the snout, maxillary, preopercle, branchiostegal membranes, and anterior half of mandibles naked. Scales on cheeks in six rows; those on opercles larger. All but the central rays of caudal fin well scaled. Dorsals and anal naked. Pectoral and ventrals scaly on basal portion.

Lateral line running very high, under end of spinous dorsal separated from dorsal outline by less than three full series of scales. Under end of soft dorsal it regains somewhat abruptly middle of sides and runs straight thence to base of tail.

D. X., 15; A. III, 8. Lat. 1. 38. Head,  $2\frac{1}{2}$  to  $2\frac{2}{3}$  in length; depth,  $2\frac{1}{4}$  to 3.

*Color*: Rosy red, overlying silvery on sides, and below the fins light yellow. A dusky spot above the middle of each orbit, and two V-shaped olive-brown marks behind the head, one from nape downward and back-

ward on each side to upper angle of gill openings, the second parallel with it, starting from origin of dorsal. Lining of buccal and gill cavities, and peritoneum silvery white.

Numerous specimens from station 2996 (112 fathoms), the largest 7 inches long.

18. *Micropogon megalops* sp. nov.

Depth,  $4\frac{3}{5}$  in length; head, 4; maxillary reaching vertical from middle of pupil,  $2\frac{7}{8}$  in head; snout,  $3\frac{3}{5}$ , equaling interorbital width; width of preorbital,  $1\frac{1}{2}$  in snout. Eye very large, a trifle less than snout, 4 to  $4\frac{1}{4}$  in head. Outer series of teeth in upper jaw little enlarged. Preopercular spines very strong, arranged as usual in this genus. Gill-rakers all short, 9 above the angle, 16 below.

Dorsal spines stronger than in *M. ectenes*, the third the longest, barely reaching origin of soft dorsal when depressed, equaling length of snout and eye. Caudal, double truncate. Second anal spine strong,  $2\frac{1}{2}$  to 3 in head. Outer ventral ray slightly produced,  $1\frac{2}{3}$  in head. Pectorals extending beyond ventrals,  $1\frac{2}{5}$  in head.

D: X. I., 27 to 29; A. II., 7; lat., l.  $50\frac{7}{14}$ .

Scales of a moderate size, seven in a vertical series between lateral line and base of dorsal.

Coloration as usual in this genus; no conspicuous oblique streaks following rows of scales above the lateral line. Axil and base of pectorals blackish. Lining of gill cavity more extensively black than in other species, the branchiostegal membrane and opercular flap abruptly silvery white within.

Four specimens were obtained from station 3021 (14 fathoms), the largest 10 inches long.

19. *Cynoscion macdonaldi* sp. nov.

Snout sharp; lower jaw protruding. Mouth moderate, somewhat oblique, the maxillary reaching vertical from middle of orbit,  $2\frac{2}{5}$  in head. No enlarged canines on either jaw.

Teeth in front of premaxillaries mainly in two distant rows, uniting laterally to form a narrow band. The inner row is composed of smaller teeth directed downward and backward, the outer series of stronger conical teeth, a few scattering teeth between the two rows. Teeth in the lower jaw in a narrow, irregular double series.

Eye small,  $5\frac{1}{4}$  in head; snout  $4\frac{2}{5}$ . Both vertical and horizontal limbs of preopercle minutely serrulate. Opercle ending in a flattened process showing two short spinous points. Gill rakers about two-thirds diameter of pupil, strong, toothed, two above angle, ten below.

Scales very strongly ctenoid, becoming greatly reduced on nape, about twenty-five transverse series between occiput and front of dorsal. A narrow, definite, scaly sheath at base of dorsal and anal; these fins otherwise naked. Caudal scaled for a short distance on basal portion. Scales above lateral line rapidly increasing in size backwards, thirteen



in a transverse series between lateral line and front of dorsal. Lateral line with from fifty to fifty-five pores, the scales above it in about eighty-five to ninety transverse series.

Dorsal spines low and weak, the rays not high, the longest  $3\frac{1}{2}$  in head. Second anal spine slender but not flexible, its length  $1\frac{1}{2}$  in soft rays. Caudal double truncate, the median rays much produced, equaling length of head behind snout. Ventrals  $1\frac{4}{5}$  in head; pectorals short, scarcely reaching tips of ventrals,  $1\frac{1}{2}$  in head.

D. X, I, 25; A. II, 7. Head  $3\frac{2}{5}$  in length; depth, 4.

*Color:* Dusky-silvery, with coarse black specks along lower part of head and sides; upper half of sides with many irregular blackish spots or blotches, showing little or no tendency to form streaks. Dorsals dusky, the basal portion with small black spots. Other fins blackish; the caudal lighter at base; mouth white within; lining of gill cavity black, becoming yellow on lining of branchiostegal membranes.

*Adult.*—The above description is from a young example  $10\frac{1}{2}$  inches long, dredged at station 3030 in 20 fathoms. An adult, about 4 feet long, agrees with this, except in the following details:

Maxillary  $2\frac{3}{5}$  in head, reaching vertical from behind eye. Eye 12 in head. Preopercle entire. Opercle emarginate behind, without evident spinous points. Gill rakers short and exceedingly strong, equaling diameter of pupil, 1 movable one above angle, nine below.

Scales on nape very closely imbricated, the exposed portions very narrow. They are in somewhat irregular series, there being from thirty-five to forty scales in a line between front of dorsal and occiput.

Highest dorsal spine  $3\frac{1}{3}$  in head. D. IX-I, 24; A. II, 7. Caudal gently rounded posteriorly, the longest ray one-half in head. Pectorals long, narrow and falcate, reaching much beyond ventrals,  $1\frac{1}{2}$  in head.

*Color:* Bluish above, dusky silvery on sides and below. No evident black spots or blotches on body or fins. Vertical fins blackish, paired fins dusky.

This species is very abundant along the entire eastern shore of the Gulf of California, and congregates in great numbers near the mouth of the Colorado River. It enters the river and is found feeding in shallow water near the shore, where it is easily approached and speared. At the head of the Gulf it is known as the sea bass, while in the vicinity of Guaymas it is goes by the native name of "Totuava." It does not seem to be known at La Paz, and was not seen by us on the western side of the Gulf. Many specimens were taken by hand-lines at the head of the Gulf, the largest weighing 172 pounds. Large specimens were also seen at Guaymas and at the mouth of the Rio del Fuerte. At Guaymas it is said to be a winter visitant, unknown during the summer months.

20. *Pseudojulis adustus* sp. nov.

*Color in spirits*: Everywhere warm brown, darker on the bases of the scales; pectorals lighter; other fins black, the soft dorsal, anal, and caudal, with a narrow white margin broader at tips of outer caudal rays. In one specimen there are traces of wavy lines on head, perhaps blue in life.

Head 3 in length; depth  $2\frac{2}{3}$ . Caudal peduncle  $1\frac{2}{3}$  in length of head; snout 3. Eye  $2\frac{1}{2}$  in snout. Four canines in lower jaw, two in the upper, directed very obliquely forwards.

Scales not continued over median line of nape, seven or eight in front of dorsal. Seven or eight series of scales on breast. No scaly sheaths at bases of dorsal or anal.

Caudal rounded, the outer rays not at all produced,  $1\frac{3}{4}$  in head. Ventrals rather long, reaching nearly to vent, the inner rays  $1\frac{3}{8}$  in the outer. Pectorals  $1\frac{7}{8}$  in head.

D. IX, 13; A. III, 12. Lat. 1. 27. Dorsal spines pungent.

Three specimens from Socorro Island, the longest 9 inches long.

21. *Pseudojulis melanotis* sp. nov.

*Color in spirits*: Light olivaceous, the back and upper part of sides with seven broad dusky cross-bars; the light interspaces less than half their width; these bars are distinct along dorsal outline, but are not continued on the dorsal fin; they become partly interrupted along dorsal portion of lateral line anteriorly, to become most prominent along middle of sides. The first bar is on the nape, the second under anterior dorsal spines. A dusky streak from eye forwards to snout, and another backwards towards opercular angle. Opercular flap with a jet-black spot, widely margined posteriorly with white. A round black spot at base of caudal, above the median rays. A dusky spot on each side above vent, in front of which are two short parallel silvery lines running obliquely downwards and forwards; faint traces of about four other silvery lines in front of these and running parallel with them. A small jet-black spot on membrane between first and second dorsal spines. Fins otherwise translucent, unmarked.

Body rather slender, depth  $4\frac{2}{3}$  in length; head  $3\frac{3}{4}$ . Snout  $3\frac{3}{4}$  in head; eye  $4\frac{1}{3}$ , equaling length of maxillary. Two anterior canines in each jaw. Posterior canines not developed.

Dorsal spines flexible, but pungent, the soft rays  $2\frac{1}{3}$  in head. Caudal rounded, the outer rays not at all produced. Pectorals and ventrals short, the outer ventral rays not produced, not reaching vent. Pectorals  $1\frac{3}{8}$  in head.

D. IX, 12; A. III, 12. Lat. line 26.

Scales not crossing median line of nape, much reduced on its anterior portion, in eight oblique rows. Scales on breast small, in nine rows. No scaly sheaths to fins.

A single specimen,  $2\frac{3}{4}$  inches long, from Station 2825.

22. *Pseudojulis inornatus* sp. nov.

*Color in spirits*: Nearly uniform olivaceous; a faint dark streak forwards from eye to end of maxillary; a dark spot on each scale along base of dorsal, forming a faint dark streak. Scales along lower half of sides edged with whitish (probably blue in life). Spinous dorsal dusky, a small black spot at base of fifth ray, another at base of last ray. Fins otherwise translucent, unmarked. Iris bright silvery.

Body very slender; depth  $5\frac{2}{3}$  in length; head  $3\frac{1}{2}$ ; depth of caudal peduncle  $11\frac{1}{3}$ ; snout  $3\frac{1}{5}$  in head; maxillary  $4\frac{2}{5}$ ; equaling diameter of orbit, which is  $1\frac{2}{5}$  in snout, and equals interorbital width.

Two canines only in front of each jaw. No posterior canines.

Distance from front of dorsal to occiput equaling distance from latter to front of eye. Dorsal spines slender and flexible. Longest soft ray  $2\frac{3}{5}$  in head. Caudal truncate, the outer rays not produced,  $1\frac{3}{4}$  in head. Pectorals and ventrals very short, the outer ray of the latter not at all produced. Pectorals 2 in head; ventrals  $2\frac{3}{5}$ , not nearly reaching vent.

D. IX, 11; A. III, 12. Lat. 1,  $27\frac{1}{10}$ .

Scales not continuous across median line of nape, six series in front of dorsal. Scales on breast much reduced; ten oblique series in front of ventrals; eighteen scales along dorsal portion of lateral line. No scaly sheaths along bases of fins.

A single specimen,  $3\frac{1}{2}$  inches long, from Station 2829.

23. *Halicheres sellifer* sp. nov.

Red, each scale on sides with a vertical blue line, those anteriorly narrowly margined with violet; upper part of cheeks and opercles with irregular blue lines and spots. A conspicuous black blotch on back between fourth and seventh dorsal spines, extending upwards on fin, and rapidly narrowing to middle of sides, where it disappears. Dorsal and caudal reddish or orange, the dorsal with oblique broken lines of blue, and a narrow blue margin, the caudal with a few blue spots at base. Anal violet at base, yellowish on distal half, narrowly margined with blue, with a wavy blue median line, and a series of broken blue lines at base. Pectorals and ventrals light orange, without distinguishing marks.

Head equals depth,  $3\frac{1}{4}$  in length. Caudal peduncle about one-half head. Maxillary  $3\frac{1}{3}$  in head; snout  $2\frac{3}{5}$ ; interorbital space 5. Eye 3 in snout. Interopercles not meeting below throat.

Two strong canines in front of upper jaw, four in front of mandible. A strong posterior canine tooth in upper jaw, at angle of mouth.

Scales somewhat reduced on breast and nape, those on nape not crossing median line, arranged in five or six oblique series; eight or nine series of scales before ventrals. No scaly sheaths along bases of dorsal and anal fins.

Caudal truncate or slightly emarginate, the outer rays scarcely produced. Outer ventrals rays produced, reaching vent, twice as long as inner rays.

D. IX, 11; A. III, 12. Dorsal spines pungent. Pectorals  $1\frac{1}{2}$  in head. Lat. 1. 28.

A single specimen,  $11\frac{1}{2}$  inches long, from Clarion Island.

24. *Thalassoma virens* sp. nov.

Uniform bright green, without distinguishing streaks or spots on head or body.

Head 3 in length; depth  $2\frac{3}{4}$  to 4; depth of head  $1\frac{1}{4}$  in its length; maxillary  $3\frac{1}{2}$  in head: snout  $2\frac{2}{5}$  to  $2\frac{3}{5}$ ; eye  $3\frac{1}{3}$  in snout; interorbital width half snout.

Two strong canines in front of each jaw, the other teeth increasing in length anteriorly, but not nearly equaling anterior pair. No posterior canines.

Scales on breast and nape reduced in size, the latter continuous over the median line of nape, in about seven rows in front of dorsal. About ten oblique rows on breast; twenty-seven or twenty-eight transverse rows on sides. Two full series of scales above lateral line, and four or five small scales along base of fin.

Depth of caudal peduncle  $2\frac{1}{5}$  in head. Outer caudal lobes greatly produced,  $1\frac{1}{3}$  in head, the middle portion truncate, one-half length of head. Outer ventral rays produced, but not nearly reaching anal; twice the length of the inner rays, half length of head. Pectorals  $1\frac{2}{5}$  in head.

D. VIII, 13; A. III, 11. Dorsal spines strong, pungent.

Very abundant at Socorro Island; the largest specimen seen, 13 inches long.

25. *Thalassoma grammaticum* sp. nov.

Bright green, each scale of sides with a purplish bar at base. Head, nape, breast, and belly purplish; the head with four green streaks on each side margined narrowly with brown. The lowermost bar runs on mandible, lower preopercular margin, and interopercle; the second runs from mandibular articulation across cheek and subopercle, showing a strong upward curve below eye; the third is nearly parallel with the second, running from angle of mouth to opercular margin, passing through lower margin of orbit; the fourth runs backwards from orbit to upper posterior angle of opercle, then downwards along margin of opercle to base of pectoral. These streaks are continued backwards more or less as wavy green streaks on breast and sides below pectorals. Dorsal and anal purplish with a wide terminal green bar nearly half as wide as fin. Upper and lower caudal rays purplish, the median rays light. Pectorals and ventrals light purplish. A small black blotch on base of pectorals above.

Head  $3\frac{1}{2}$  to  $3\frac{3}{4}$  in length; depth 3 to  $3\frac{1}{2}$ ; maxillary  $4\frac{1}{2}$  in head; snout 3; interorbital width 4. Eye  $2\frac{1}{2}$  in snout. Two canines in front of each jaw; no posterior canines; teeth gradually enlarging towards front of each jaw, those next the anterior pair not more than two-thirds their length. Interopercles greatly produced, meeting or overlapping on median line below.

Scales somewhat reduced on nape and breast, continuous over median line of nape. Seven or eight oblique rows in front of dorsal, nine or ten series in front of ventrals. Well-defined sheaths at base of dorsal and anal.

Caudal fin very deeply lunate, the outer rays greatly produced, forming lobes nearly twice as long as median rays in the adult, but little produced in the young. Outer ventral rays produced, not quite twice length of inner rays, not reaching vent. Pectorals  $1\frac{1}{2}$  in head.

D. VIII, 13; A. III, 11. Dorsal spines pungent.

Abundant at Socorro Island; a single specimen from Clarion Island, the largest obtained,  $11\frac{1}{2}$  inches long.

26. *Thalassoma socorroense* sp. nov.

Deep brown, each scale on sides with a vertical bluish bar at base, narrowly margined with light blue. Sides of head thickly covered with small purplish or bluish spots and broken lines margined with darker blue, those on cheeks arranged in lines radiating from the eye. Dorsal and anal purplish, a submarginal light streak (probably blue in life), and a narrow white margin. A black blotch on anterior rays of spinous dorsal. Pectorals and ventrals purplish at base, with more or less orange or yellow on distal portion. Caudal brownish, the outer rays tipped with black.

Head equaling depth, 3 to  $3\frac{1}{4}$  in length; depth of caudal peduncle  $2\frac{1}{5}$  in head; maxillary  $3\frac{1}{2}$ ; snout  $2\frac{2}{3}$ ; interorbital  $4\frac{1}{3}$ . Eye 3 inches in snout. Interopercles meeting below on median line of throat.

Scales reduced on breast and nape, the latter scaled over median line; eight or nine scales in a row along nape, arranged in five or six oblique series; thirteen oblique rows on breast. Well developed scaly sheaths along bases of dorsal and anal, and series of scales running out on membranes between rays of caudal.

Outer caudal rays little produced, the outline of fin gently concave. The longest ray equals length of head in front of preopercular margin. Ventrals short, the outer rays not produced, the inner rays contained  $1\frac{2}{5}$  in length of outer. Pectorals short and broad,  $1\frac{3}{4}$  in head. Dorsal spines strong and sharp.

D. VIII, 13; A. III, 11; Lat. 1., 27.

Abundant at Socorro Island; the longest specimen  $10\frac{1}{2}$  inches.

**Calotomus** gen. nov.

Teeth distinct, equal, imbricated, arranged in regular oblique rows in both jaws, wholly concealing the dental plate, to the anterior surface of which they are affixed. Cutting edge of both jaws formed by the outer teeth, the dental plate not reaching edge, and visible only from within.

Lips double for a short distance only next the angle. Scales on cheeks in one row. Lateral line continuous. Bases of dorsal and anal fins with scaly sheaths. Dorsal spines nine, soft and flexible. Gill membranes broadly joined to the isthmus.

This genus differs from *Cryptotomus* in the distinct and regularly imbricated teeth, similar in both jaws. Bleeker may have used the name *Calliodon* in this sense, but the type of *Calliodon* (*C. lineatus*) is almost certainly a *Scarus*, and the name is therefore not available.

Type, *Calotomus xenodon* sp. nov.

27. *Calotomus xenodon* sp. nov.

Body deep, compressed, the depth  $2\frac{2}{3}$  in length; head,  $3\frac{1}{3}$ ; snout short and convex,  $2\frac{2}{3}$  in head; interorbital width, 4; maxillary,  $3\frac{1}{4}$ ; eye,  $2\frac{1}{3}$  in snout.

Teeth pointed, imbricated in quincunx order, both tips and edges wholly free, the anterior face convex, the posterior face alone adnate to the dental plate. They are of equal size and similar in both jaws, there being three or four teeth in an oblique cross-series anteriorly, about twelve of these series in the upper jaw, and fourteen in the lower. Two teeth in the upper jaw at the angle of the mouth are conical and curved downwards and backwards.

Scales on cheeks in a single series, three or four in number. Four scales on median line before dorsal fin, the anterior one encroaching on occiput. Scales on breast not reduced, three on median line before ventrals, one and one-half series of scales between lateral line and dorsal, the half series forming a sheath along base of fin.

D. IX, 10; A. III, 9. Scales  $25\frac{1\frac{1}{2}}{7}$ .

Dorsal spines rather high and flexible, the origin of fin over base of pectorals. Caudal deeply lunate, the outer rays produced, one-third longer than the middle rays,  $1\frac{1}{4}$  in head. None of the ventral rays elongate, the fin reaching about half way to vent,  $1\frac{1}{5}$  in head. Pectorals with wide oblique base, the free margin of fin somewhat *f*-shaped, the upper angle acute, the lower rounded, the longest ray  $1\frac{1}{3}$  in head.

*Color*: Mottled silvery, slaty, and brown, without definite pattern. Top of head and snout dusky. Pectorals black at base. Ventrals dusky at tip. Dorsal and anal black on basal half, mottled distally. Caudal mottled, narrowly edged behind with white.

Two specimens from Socorro Island, the longest 14 inches long.

28. *Microspathodon cinereus* sp. nov.

This species apparently differs from the type of *Microspathodon* in the production of its dorsal, anal, and caudal lobes to form filaments, and to some extent in the dentition. It may be necessary to consider it the type of a distinct genus.

Body deep, compressed, the nape high and compressed, the anterior profile very steep, slightly concave in front of orbits. Head very wide and heavy below, mouth wide, transverse, its width nearly twice its lateral cleft, the maxillary reaching vertical from midway between nostril and front of eye. Maxillary almost wholly slipping under the broad preorbital, its distal half strongly U-shaped, with the convexity backwards, and its anterior margin displaying a deep re-entrant curve.

Dentary portion of mandible consisting of an anterior transverse portion, and the two lateral limbs, which form about a right angle with anterior portion, and are convexly bent towards median line. It would much resemble a U with the lateral limbs convex inwards instead of outwards. The anterior portion is provided with a single series of rather firmly fixed elongate incisor teeth with truncate edges; the lateral teeth are similar but smaller.

Teeth in the upper jaw strongly compressed laterally, but with the extreme tip flattened antero-posteriorly, so as to render them narrow incisors. They are very loosely implanted, extremely movable, and are in a single functional series, the teeth of which are replaced by others which appear above along front of jaw. Between vomer and front of jaw is a median firm fleshy pad, with free anterior margins; a somewhat similar pad at each angle of mouth. No teeth on vomer or palatines.

Nostril single, round, midway between front of jaw and middle of orbit. Eye small, high, its diameter  $2\frac{1}{3}$  in width of preorbital, 5 in head. Preopercle smooth or minutely crenate at the angle; none of the bones of head serrate or spinous. Gills  $3\frac{1}{2}$ , the inner half of fourth gill developed about one-fourth length of others. A small but evident pore behind fourth gill. Gill-rakers short and weak, not toothed, about twenty on anterior limb of outer arch. Gill membranes forming a broad fold across the isthmus.

Fins entirely enveloped in scales, which are large at base of fins, becoming minute on soft portions. Dorsal spines strong, regularly increasing, the highest  $2\frac{1}{2}$  in head. Anal spines strong, the second but little shorter than longest dorsal spines. Soft dorsal and anal fins conspicuously falcate, the median rays of fins produced beyond fork of caudal, the anterior margins strongly convex, the posterior strongly concave. Longest dorsal and anal rays more than half length. Caudal deeply forked, the lobes also greatly falcate, equaling in length the lobes of dorsal and anal. Outer ventral rays produced, extending beyond front of anal. Pectorals short, rounded, reaching vertical from vent.

Scales large, rough, vertically much deeper than wide, with numerous small accessory scales at base which become exceedingly numerous on head and nape, where they form a shagreen-like covering. Lateral line little prominent, the pores opening on under surface of scales, ceasing under last rays of soft dorsal.

Head,  $3\frac{1}{2}$  in length; depth, one-half length to tip of median caudal rays. D. XII, 16; A. II, 14. Lat. l. 29 (twenty-two pores).

*Color*: Uniform slaty gray, the fins somewhat darker, all but spinous dorsal narrowly white-margined. Peritoneum gray.

Abundant on rocky reefs at Clarion and Socorro Island; a single specimen secured, about 7 inches long.

29. *Holacanthus clarionensis* sp. nov.

Preopercular spine gently curved, its outer face channeled, the spine fitting into a groove in front of base of pectoral,  $2\frac{1}{2}$  in head, not reaching vertical from margin of opercle. Vertical limb of preopercle with twenty to twenty-five short strong spines; horizontal limb with two spines pointing backwards; the anterior portion of margin of interopercle with two strong spines; from one to three smaller spines behind these. Preorbital with a strong compressed blunt spine directed forwards, and two sharp ones below it. Posterior margin of subopercle with a series of short spines. No opercular spines.

Anterior profile very slightly concave above orbits, the snout not protruding; maxillary 4 in head. Eye small, little more than half snout,  $4\frac{1}{2}$  in head,  $1\frac{1}{2}$  in interorbital width.

Head, 4 in length; depth,  $1\frac{7}{8}$ . D. XIV, 18; A. III, 18.

Membrane of first dorsal spine free from scales; of second and third, partly scaly; other spines with membranes wholly scaled. Length of fourteenth spine  $2\frac{1}{5}$  in head. Soft dorsal and anal not produced, the angles rounded, the posterior margins inclined but slightly forwards, and about on vertical of base of caudal. Longest rays of dorsal and anal equal,  $1\frac{1}{4}$  in head. Caudal truncate when widely spread, the angles not rounded, the outer rays not at all produced, about equaling length of head; pectorals and ventrals about equal, equaling length of head, the ventrals with outer rays slightly produced, reaching to or slightly beyond vent.

Scales large, everywhere covered with small basal accessory scales, all rough-ctenoid. Lateral line much arched, concurrent with the back, incomplete, ending under middle of soft dorsal, with only 35 pores.

*Color*: Head and body very dark olive-brown, a wide orange-red bar behind head, including nape and back as far as sixth dorsal spine, becoming narrow on middle of sides, and expanding again below to include region from gill openings nearly to vent, being here, however, darker and less distinctly defined. The yellowish color continues backwards as a submarginal band on dorsal and anal, the margin being deep blue, broader posteriorly. Caudal bright orange-red, with



very narrow blue margin. Pectorals yellowish. Ventrals yellowish-olive. Vertical fins otherwise with color of sides.

This brilliant species is extremely abundant at Clarion, Socorro, and San Benedicto Islands. It reaches a length of about 7 inches.

30. *Gobius zebra* sp. nov.

Body not elongate, the snout short, the mouth oblique, with maxillary reaching below middle of orbit.

Head 3 in length; depth  $4\frac{1}{3}$ . D. VI, 11 or 12; A. 9. L. one-half inch.

Mouth small, the maxillary  $2\frac{1}{2}$  in head. Interorbital space very narrow. Eye  $3\frac{1}{4}$  in head. Teeth in upper jaw in a narrow band or double series, the outer row enlarged and spaced. Lower jaw apparently with a single series, similar to the outer row in the upper jaw.

Scales cycloid, large, wanting on nape and a narrow strip along base of spinous dorsal.

*Color*: Cherry-red, head and sides with fifteen blue cross-bars, a little narrower than interspaces, encircling body posteriorly, lacking for a short distance on belly and under side of head. On upper side of head and nape these bars run obliquely forwards and downwards, but are elsewhere vertical. On middle of each interspace a very narrow blue line, becoming indistinct on lower part of sides. On cheeks the blue bars are connected by narrow cross-lines forming blue reticulations surrounding round spots of the ground color.

Two specimens from Station 2,989, in 36 fathoms.

31. *Gobius dalli* sp. nov.

Resembling species of *Microgobius*. With short compressed body, high head, and moderate, very oblique mouth; upper pectoral rays normal; scales ctenoid, of moderate size; anterior dorsal spines much produced.

Head  $3\frac{2}{3}$  in length; depth  $4\frac{1}{3}$ . D. VI-17; A. 14. Lat. l. 40.

Mouth very oblique, the maxillary reaching vertical from front of pupil,  $2\frac{1}{2}$  in length of head. Snout short, two-thirds diameter of orbit, which is 3 in head. Jaws with an outer series of long, distant, canine-like teeth, and an inner series or a narrow band of minute teeth.

Dorsal spines six, the two anterior greatly elongate, not free, in our largest specimen extending beyond middle of soft dorsal. Membrane from last dorsal spine reaching to, or nearly to, base of first soft ray. Soft dorsal rather high, the fin long. Caudal rounded, less than length of head. Ventrals free from belly, fully united. Pectorals short, the upper rays not free nor silk-like.

Scales of moderate size, ctenoid, covering entire trunk, with possible exception of the nape. The scales are readily caducous, and are lacking on nape and frequently on anterior third of body in our specimens.

*Color*: Light coral-red, anteriorly with four to six narrow blue bands not reaching ventral outline, the posterior ones growing narrower and fainter. A blue streak upwards and backwards from each orbit, the two uniting on occiput. A transverse interorbital bar, a continuation of which encircles the orbit anteriorly. Below orbit, a blue bar consisting of two portions, one running downwards and obliquely backwards, the other upwards and backwards. In the largest specimen a blue streak runs from occiput along profile to front of dorsal. The first blue bar runs from nape obliquely downwards and forwards, ending on opercle. The second vertically downwards from front of spinous dorsal, the third under middle of spinous dorsal, the remaining bars under soft dorsal. Fins unmarked.

Several small specimens, the largest 1 inch long, from Station 3001, 33 fathoms.

A single slightly larger example dredged by Mr. W. H. Dall, in about 35 fathoms, off Catalina Harbor, California.

### 32. *Microgobius cyclolepis* sp. nov.

Resembling *M. emblematicus*, differing in larger scales and different coloration.

Body somewhat elongate, compressed, the mouth very large, narrow, and oblique; maxillary produced beyond the rictus for a distance equaling two-thirds diameter of orbit, reaching vertical from posterior margin of pupil,  $1\frac{3}{5}$  in head. Snout short, 5 in head. Eye larger,  $3\frac{3}{4}$  in head. Interorbital width one-half orbit.

Teeth in upper jaw in two series, the outer enlarged and distant; in lower jaw apparently in a single series, similar to outer series of upper jaw, with two stronger canines anteriorly.

Inner edge of shoulder girdle without fleshy prominences.

Dorsal spines seven, none of them elongate, the membrane of last spine reaching base of first soft ray. Soft anal rays of moderate height,  $1\frac{1}{2}$  in head, the tips of last rays reaching base of caudal, the fin similar to soft dorsal but lower. Caudal long, apparently rounded posteriorly, longer than head (mutilated in our specimen). Ventrals and pectorals reaching vent.

Scales cycloid, small, absent on belly, nape, and on sides in front of fourth dorsal spine. About forty-eight transverse rows of scales.

D. VII-16; A. 17.

*Color in spirits*: Light olive, the fins dusky; a conspicuous round black spot on shoulder, half size of eye, its posterior margin denser black.

A single specimen, about 2 inches long, from Station 3020, in 7 fathoms.

33. *Sebastichthys* [goodei\* Eigenmann] sp. nov.

DIAGNOSIS: Scales small ctenoid. Cranial ridges and spines mostly obsolete. Lower jaw projecting. Anal spines graduated. Body slender. Sides with red.

Body very slender, with narrow caudal peduncle, sharp snout, and much projecting lower jaw; the latter well entering profile and furnished with symphyseal knob. Maxillary reaching slightly beyond middle of orbit,  $2\frac{1}{3}$  in head. Eye moderate, slightly longer than snout,  $3\frac{2}{3}$  in head. Preorbital narrow, its least width two-fifths pupil, with a minute spine or none. Nasal spine obsolete.

Interorbital space wide, flat, without conspicuous ridges. Preocular and supraocular spines obsolete. Occasionally a minute tympanic or occipital spine present, the top of head otherwise smooth. Interorbital width  $4\frac{1}{2}$  in head. Preorbital region not prominent. All but the occipital ridges obsolete and scaled over.

Preopercular spines flat, sharp, all directed backward, the second and third equal, the others shorter. Opercular and suprascapular spines well developed.

Gill rakers long and slender, about twenty-five on anterior limb of arch, the longest half length of orbit.

Dorsal spines low and slender, the longest about  $2\frac{2}{3}$  in head, the twelfth half height of thirteenth, the latter about half the height of soft rays, which are lower than the spines. Caudal forked for one-third its length.

Anal very small, the spines short but strong, graduated, the second stronger and slightly shorter than third, its length half orbit. Soft anal rays low, their height one-fourth head. Pectoral not reaching vent,  $1\frac{2}{3}$  in head, projecting beyond tips of ventrals.

Head  $2\frac{1}{5}$  in length; depth  $3\frac{2}{3}$ . Least depth of caudal peduncle less than diameter of orbit. D. XII, I, 14. A. III, 8. Lat. l. 55 (pores); about ninety transverse series above lat. l. L. 12 inches.

Scales rough-ctenoid, completely investing head and body, including maxillaries, mandible; and outer branchiostegal rays.

*Color:* Dusky-olivaceous above, silvery on sides and below, more or less flushed with red. Spinous dorsal somewhat dusky, vertical fins otherwise yellowish, without distinctive markings. Lining of mouth and gill cavity white. Peritoneum white, with small scattered black stellate spots, and more or less clouded with minute specks.

Three specimens from Station 2949, in 155 fathoms.

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\* In a paper by Dr. Carl H. Eigenmann, received as these sheets are passing through the press, this species is described under the name of *Sebastodes goodei*. The name proposed by Dr. Gilbert is therefore withdrawn. [ED.]

34. *Sebastichthys alutus* sp. nov.

DIAGNOSIS: Scales small, ctenoid; fifty tubes in lateral line. Crests evident but low; nasal, preocular, supraocular, postocular, tympanic and occipital spines present. Peritoneum black, buccal and gill cavities white. Second anal spine enlarged.

*Specific description*: Depth  $3\frac{1}{5}$  in length; head  $3\frac{2}{3}$ . Caudal peduncle one-fourth the depth. Maxillary extending to middle of pupil,  $2\frac{1}{3}$  in head. Teeth in very narrow bands in jaws, and on vomer and palatines. Preorbital very narrow, anteriorly lobate, but without distinct spines. Eye  $3\frac{1}{4}$  in head. Interorbital space broad and flat, the supraocular ridges scarcely elevated; interorbital width  $1\frac{1}{3}$  in orbit. Ridges all low, and with distinct but not prominent spines. Spines on preopercle all broadly triangular, directed backwards, those on horizontal limb larger than usual. Two spines on shoulder and two on opercle.

Gill rakers long and very slender, the longest one-half orbit; twenty-six on anterior limb.

Scales small, rough, those above lateral line much smaller than others, and irregularly disposed. Those on breast, snout, maxillary, and mandible smooth.

Fins low, the dorsal little elevated, and the notch shallow, the longest spine  $2\frac{3}{4}$  in head, the twelfth  $1\frac{3}{4}$  in longest. Soft rays also low. Caudal slightly emarginate,  $1\frac{4}{5}$  in head. Second anal spine enlarged, much longer and stronger than third, as long as soft rays, but not nearly reaching their tips in reflexed fin,  $2\frac{1}{3}$  in head. Ventrals reaching vent, and pectorals slightly beyond, the latter without procurvent base or thickened rays.

D. XIII, 15; A. III, 8. Lat. l. 50 (tubes).

*Color*: Dusky above, with faint traces of darker blotches along back. A dark blotch on opercle, one on subopercle, and one on upper half of axil. Top of head, including membrane of premaxillary, dusky. Spinous dorsal with a distinct dark terminal band; the other fins, except pectorals, margined with blackish. Peritoneum black; mouth cavity white.

A single specimen, about 6 inches long, from Station 2946, in 150 fathoms.

35. *Sebastichthys rupestris* sp. nov.

DIAGNOSIS: Scales large, ctenoid. Cranial ridges well developed, sharp, the postocular and tympanic both present. Peritoneum black. Buccal and gill cavities white or slightly dusky. Second anal spine stronger than third.

*Specific description*: Depth  $2\frac{5}{6}$  to 3 in length; head  $2\frac{1}{2}$ . Maxillary reaching beyond middle of pupil,  $2\frac{1}{4}$  in head. Jaws equal, the tip of the lower scarcely projecting. Teeth in very narrow bands in jaws and on vomer and palatines. Preorbital very narrow, its least width less than one-fourth pupil, lobate and without spines. Eye  $2\frac{4}{5}$  in head,

lower than snout or interorbital space. The latter narrow, concave, without ridges, the least width one-half the orbit.

Supraocular ridge short. Nasal, preocular, supraocular, postocular, tympanic, occipital, and nuchal spines present, the ridges of moderate height, but the spines, especially postocular and tympanic, strong. The preocular ridge but little conspicuous, the spine much smaller than in *S. sinensis* and *zacentrus*. Spines on shoulder little developed. Opercular spines rather weak. Preopercular spines small, the two upper directed backwards, the others downwards and backwards.

Dorsal fins not deeply notched, the longest spine 3 in head, the twelfth half its length. Soft dorsal not high. Caudal truncate. Second anal spine longer and stronger than third, as long as soft rays, but not reaching their tips when the fin is declined,  $2\frac{2}{3}$  in head. Pectorals short,  $1\frac{5}{8}$  to 2 in head, reaching beyond ventrals, but usually not to vent.

D. XIII, 13; A. III, 7. Pores in lateral line, thirty-one. About sixty vertical series counted above the lateral line.

Scales rough-ctenoid. Snout naked or nearly so. Scales on maxillary and mandible minute and smooth, little evident. Those on breast rough. Fins invested in a thick membrane covered with fine scales.

*Color*: As in *S. zacentrus*, but usually with two elongate black streaks below lateral line. A black blotch on middle of ventrals. A bar at base of pectorals and in axil.

Five specimens, the longest  $5\frac{1}{2}$  inches long, from Station 2946, in 150 fathoms.

### 36. *Sebastichthys zacentrus* sp. nov.

**DIAGNOSIS**: Scales large; cranial ridges moderate, the postocular spine wanting, the preocular strong. Scales strongly ctenoid. Second anal spine very long, reaching tip of soft rays when the fin is reflexed. Peritoneum black, lining of buccal cavity white. Second anal spine enlarged.

*Specific description*: Body elongate, depth  $3\frac{1}{3}$  in length. Caudal peduncle narrow,  $3\frac{2}{3}$  in depth of body. Head  $2\frac{1}{2}$  in length. Mouth moderate, maxillary reaching vertical from middle of pupil,  $2\frac{1}{3}$  in head. Lower jaw slightly the longest, the tip with a small knob. Teeth in very narrow bands. Eye much longer than snout, 3 to  $3\frac{1}{4}$  in head. Interorbital space narrow, somewhat concave,  $1\frac{2}{3}$  in diameter of orbit. Preorbital extremely narrow, its least width two-sevenths pupil.

Ridges on head low, but sharp, the spines rather strong. Preocular ridge strong, triangular, ending in a strong outwardly-directed spine. Nasal, preocular, supraocular, tympanic, occipital, and sometimes nuchal spines present. Two spines on shoulder, two on opercle, and the usual five on preopercle, the latter directed backwards. Preorbital lobate, but without spines.

Gill-rakers long, very slender, one-half diameter of orbit, twenty-six present on anterior limb of outer arch.

Spinous dorsal low, with strong spines, the longest  $2\frac{1}{3}$  to  $2\frac{1}{2}$  in head. Notch between dorsals rather shallow, the shortest spine more than one-half the longest. Soft rays about equaling the spines. Caudal truncate or slightly emarginate,  $1\frac{2}{3}$  in head. Second anal spine very long, usually longer and stronger than third, curved,  $1\frac{1}{2}$  to  $1\frac{1}{3}$  in head, reaching to or beyond tips of soft rays in declined fin. Ventrals reaching beyond vent,  $1\frac{2}{5}$  in head. Pectorals reaching nearly to front of anal,  $1\frac{1}{3}$  in head, the fin not procurvent, the lower half with greatly thickened rays.

D. XIII, 14 or 15; A. III, 7 or 8. Tubes of lateral line about forty-two; seventy vertical series above lateral line.

Scales large, rough-ctenoid; those on maxillary, mandible, and breast smoother.

*Color*: Five vaguely defined black bars on back; one downward from nape and front of dorsal, two approximated under spinous dorsal, one under middle of soft dorsal, and one on caudal peduncle. Those under dorsal encroach more or less on the fin. All but the first are continued below lateral line on middle of sides, the third interrupted above lateral line. Two black streaks backwards from eye, the upper terminating in a conspicuous black blotch on opercle, the lower ending on subopercle. Caudal unmarked or with an obscure dusky median blotch. Other fins unmarked. A faint dusky axillary blotch.

Sides marked with some red in life.

Roof of mouth posteriorly dusky, buccal and branchial cavities otherwise white. Peritoneum jet black.

Three specimens  $5\frac{1}{2}$  to  $6\frac{1}{2}$  inches long, from Stations 2893 and 2946, in 145 and 150 fathoms.

### 37. *Sebastichthys saxicola* sp. nov.

**DIAGNOSIS**: Scales moderate. Pores in lateral line forty-five. Cranial ridges low, postocular wanting. Peritoneum black, buccal and gill cavities white. Second anal spine much enlarged. Gill-rakers long and slender. Mandibular tip strongly projecting.

*Specific description*: Depth, 3 to  $3\frac{1}{4}$  in length; head,  $2\frac{2}{3}$  to  $2\frac{2}{3}$ . D. XIII, 12 or 13; A. III, 7. Lat. l. 45 (pores). L., 12 inches.

Mouth large, maxillary reaching nearly to posterior margin of pupil,  $2\frac{1}{4}$  in head. Mandible laterally included, the tip strongly projecting, with conspicuous symphyseal knob, which enters profile. Eye large,  $2\frac{3}{4}$  to  $3\frac{1}{4}$  in head, much longer than snout, or interorbital width. Interorbital space flat or slightly concave, without ridges, the supraocular ridges little elevated, the least width about equaling snout, 5 in head. Preorbital narrow, one-third pupil, with two strong triangular lobes with spinous tips.

Cranial ridges low but evident, the spines rather strong. Nasal, preocular, supraocular, tympanic, occipital and sometimes nuchal spines present. The preocular ridge prominent, the spine projecting above

eye. Preopercular spines directed backward, or the lowest slightly oblique. Gill-rakers long and slender, the longest two-fifths orbit. Highest dorsal spine  $2\frac{1}{2}$  in head, the spines moderately strong, the membrane not deeply incised. Height of soft rays about equaling that of spines. Caudal emarginate. Second anal spine longer and stronger than third, and longer than soft rays, 2 to  $2\frac{1}{3}$  in head. Ventrals usually not to vent. Pectorals nearly to front of anal. Scales rough-ctenoid on breast, maxillary, mandible, and snout.

*Color*: Olivaceous above, silvery below, overlaid below with light red; young with three or four brownish-black bars on sides, becoming faint in older specimens and sometimes also in young; in these a dusky blotch on occiput, one including front of dorsal, one under posterior rays of dorsal, one under soft dorsal, and one on back of tail. Dorsals sometimes with black spots, the spinous dorsal often with a submedian band of black, above which the incised membrane is white. Conspicuous olive-brown spots on caudal, usually confined to base and upper lobe of fin. Very abundant in deep water off the coast of southern California; taken at Stations 2893, 2907, 2949, 2959, and 2973, from 44 to 155 fathoms.

38. *Sebastichthys diploproa* sp. nov.

*DIAGNOSIS*: Scales large, ctenoid; cranial ridges rather weak but evident; postocular spines wanting; peritoneum black; buccal cavity white. Premaxillaries greatly produced on each side of median line. No dark markings. Gill-rakers long and slender. Second anal spine enlarged.

*Specific description*: Depth,  $2\frac{3}{4}$  in length; head,  $2\frac{1}{2}$ . D. XIII, 12 or 13; A. III, 7. Lat. 1. 35 (tubes).

Maxillary reaching beyond middle of pupil,  $2\frac{2}{5}$  in head. Premaxillary produced on each side of median line, forming two forwardly projecting dentigerous lobes, in the deep emargination between which fits the tip of mandible. Symphyseal knob small.

Eye large, 3 to  $3\frac{1}{2}$  in head. Preorbital narrow, one-third pupil, with two strong diverging spines. Interorbital space rather wide,  $1\frac{2}{3}$  in orbit, slightly concave, with a pair of low ridges or none. Occipital ridge prominent, sharp, the others low, but with strong spines; nasal, preocular, supraocular, tympanic, and occipital spines present. Preopercular spines strong, the second usually the longest, the third, fourth, and fifth directed downwards and backwards. Opercular spines longer than those on preopercle. Two small spines on shoulder.

Gill-rakers long and very slender, the longest half orbit.

Dorsal spines moderate, longer than soft rays, the longest  $2\frac{1}{2}$  in head, the twelfth two-fifths its height. Caudal emarginate. Second anal spine longer and stronger than third, shorter than soft rays,  $2\frac{1}{2}$  to 3 in head. Ventrals barely reaching vent; the pectorals slightly beyond,  $1\frac{2}{3}$  in head, with broad base, the lower rays not thickened.

Scales large, minutely spinous and readily deciduous, very small and cycloid on maxillary, mandible, and breast.

Fin membranes thick and scaled.

*Color:* Uniform rose red above, bright silvery on sides and below, sparsely black-punctate, a faint dusky bar behind pectorals. Peritoneum jet-black. Spinous dorsal with dusky margins, the fins otherwise unmarked.

Many specimens, the largest described being 7 inches long, from Station 2935, in 124 fathoms.

### 39 *Sebastichthys aurora* sp. nov.

**DIAGNOSIS:** Scales, large, ctenoid. Cranial ridges and spines strong, the postocular, nuchal, and coronal spines present. Peritoneum, black. Mouth cavity, white. The second anal spine enlarged. Color, red.

*Specific description:* Depth,  $2\frac{3}{4}$  in length; head,  $2\frac{1}{2}$ . Pores of lat. 1. 29. D. XIII, 13 or 14; A. III, 6. L. 12 inches.

Mouth large, the maxillary nearly reaching vertical from posterior margin of orbit,  $2\frac{1}{4}$  in head, its width equaling diameter of pupil. Mandible, laterally as well as in front, largely shutting within the wide premaxillary band of teeth. Bands on vomer and palatines also wide. Eye large,  $3\frac{1}{3}$  in head, much longer than snout or than interorbital space. Interorbital space narrow, somewhat concave, with a pair of strong ridges, its width half diameter of orbit.

Cranial ridges sharp, compressed, somewhat as in *S. rosaceus*, the preocular not specially prominent. Nasal, preocular, supraocular, postocular tympanic, occipital, nuchal, and usually coronal spines present. Preopercular spines regularly radiating, the upper four more nearly equal than usual. Preorbital wider, its least width two-fifths pupil, with two strong triangular spines, directed downwards and backwards. Gill-rakers slender, the longest little more than one-third of eye.

Dorsal spines strong, not high, the longest  $2\frac{1}{2}$  in head, the twelfth about one-third its height. Soft rays lower than spines. Caudal slightly emarginate. Second anal spine very strong, much longer and stronger than third, and about equaling in length the soft rays, its length about  $2\frac{1}{2}$  in head. Ventrals reaching to or slightly beyond vent. Pectorals to front of anal.

Scales very rough-ctenoid, those of lateral line enlarged, covering breast, branchiostegal rays, mandible, maxillary, and part of snout; everywhere rough. Fins enveloped in a more or less lax membrane, invested with fine ctenoid scales.

*Color:* Uniform red, light below. A narrow black streak along edge of spinous dorsal, the triangular incised portions of membrane above it white. A similar mark between second and third anal spines. Fins otherwise unmarked.

From stations 2948 and 2960, in 266 and 267 fathoms.



40. *Sebastichthys introniger* sp. nov.

DIAGNOSIS: Scales large. Cranial ridges strong but not high; tympanic, nuchal, and postocular spines present. Peritoneum jet-black, buccal and gill cavities mostly black. Scales very rough, and with numerous accessory scales. Lower jaw projecting, with prominent symphyseal knob. Second anal spine equaling third.

*Specific description*: Body deep, compressed, interorbital space wide, but little concave, the ridges low and nearly parallel, the spines conical and very strong.

Head  $2\frac{1}{2}$  in length; depth  $2\frac{1}{5}$ . D. XIII, 13: A. III, 7. Lat. 1. 30 to 35 (pores), about fifty-five vertical series of scales. L. 13 inches.

Mouth large, somewhat oblique, maxillary nearly reaching vertical from posterior margin of pupil,  $2\frac{1}{5}$  in head. The prominent tip of mandible fitting into emargination between premaxillaries. Bands of teeth narrow on jaws, vomer, and palatines. Eyes very large,  $3\frac{1}{2}$  in head; interorbital width  $5\frac{1}{3}$  in head.

Preorbital with a raised ridge in front of eye; anteriorly with two flattened triangular lobes, sometimes bearing minute spinous points. Supraorbital ridge short, flat, and low, ending over posterior border of pupil. Nasal spines low; preocular not prominent; supraocular, postocular, tympanic, occipital, and nuchal strong. Two upper preopercular spines appromixated, equal, directed backwards, the three lower downwards and backwards. Spines on shoulder and opercles strong. Gill-rakers slender, of moderate length, not close set, the longest  $2\frac{1}{2}$  in diameter of eye.

Dorsal spines strong, low,  $3\frac{1}{4}$  in length of head, the twelfth more than half the longest; soft rays higher,  $2\frac{3}{4}$  in head. Caudal emarginate,  $1\frac{1}{5}$  in head. Second anal spine equaling third in length, but little stronger, about  $1\frac{1}{2}$  in soft rays. Pectorals reaching to or slightly beyond vent to beyond tips of ventrals.

Scales large, everywhere very strongly ctenoid, with numerous accessory scales, covering most of snout, maxillary mandible, branchiostegal rays, and gular membrane. Vertical fins with lax membranes, closely scaled. Lower pectoral rays not thickened.

*Color*: Red, with two faint wide dusky bars reaching to below middle of sides, one under middle of spinous dorsal, one under soft dorsal. A black blotch on opercle. A small black bar under upper two preopercular spines. Axil black. Lining membrane of mouth and gill cavity largely black. Peritoneum jet-black. Soft dorsal, caudal, anal, and ventrals with distinct blackish margins. Pectorals unmarked.

Two specimens from Station 2948, in 266 fathoms.

41. *Sebastichthys sinensis* sp. nov.

DIAGNOSIS: Scales moderate, tubes of lateral line forty to forty-five, almost everywhere cycloid, not regularly imbricated; cranial ridges moderately high, the spines well-developed; nasal, preocular, supraoc-

ular, tympanic, and occipital spines present; mandible partly scaled; peritoneum, buccal, and gill cavities black; anal spines short, graduated.

*Specific Description:* Body short and deep, heavy anteriorly, with slender caudal peduncle; mouth large, maxillary reaching beyond pupil,  $2\frac{1}{5}$  in head, its greatest width less than one-third its greatest length; jaws about equal, the lower mostly included within the upper, but the tip fitting into a notch between intermaxillaries, and with a somewhat projecting symphyseal knob; teeth present on vomer and in a long slender patch on palatines; eye very large,  $2\frac{3}{4}$  to 3 in head; snout  $4\frac{2}{3}$  to 5 in head; interorbital space rather narrow, concave, with a pair of low ridges; its width 6 in head.

Nasal spines present, preocular spines strong, triangular, directed outwards; supraocular ridges low, but evident, diverging posteriorly, ending in strong spines; tympanic and occipital spines also strong; upper three preopercular spines equal in length, placed close, and usually nearly parallel, directed backwards. The lower two small, directed downwards and backwards. Two opercular, two suprascapular, and two or three strong preorbital spines present.

Gill-rakers slender, the longest one-fifth orbit, twenty-one on anterior limb of outer arch.

Spines rather high and strong, the dorsal moderately notched, the highest spine  $2\frac{1}{3}$  in head, about equal to soft rays, the lowest nearly one-half its height; membranes not deeply incised; second anal spine longer and stronger than third or than any of dorsal spines and longer than anal rays; its length about  $\frac{1}{2}$  head.

Caudal slightly lunate, one-half head; pectorals reaching slightly beyond vent, the lower rays not thickened, the fin  $1\frac{2}{5}$  in head; ventral spine as long as soft rays,  $2\frac{1}{4}$  in head.

Scales small, not regularly imbricated, smooth and cycloid, except those on occiput and a few along lateral line on posterior part of body; snout naked, maxillary and mandible only partly scaled: soft rays of all the fins covered with series of small scales.

Head  $2\frac{1}{2}$  in length; depth 3 D. XIII, 12; A. III, 5 Lat. 1. (tubes) 40 to 45.

*Color:* Pale below, dusky above, blotched with reddish and black; a blackish blotch on opercle; fins dull reddish, irregularly marked with blackish, the caudal mostly red, sometimes with a blackish terminal bar; cavity of mouth and gill-chamber and peritoneum jet-black.

Two specimens, the largest 7 inches long, from Station 3015, in 145 fathoms.

#### 42. *Scorpæna* (*Sebastoplus*) *sierra* sp. nov.

Body of moderate depth, the snout sharp, the caudal peduncle slender, wedge-shaped.

Head  $2\frac{1}{3}$  in length; depth 3. D. XII-10; A. III, 5, Lat. 1. 25 (tubes). Least depth of caudal peduncle less than one-fifth head.

Mouth large, the lower jaw wholly included, the dentigerous portion of premaxillaries shutting outside of mandible, with a deep notch anteriorly, which receives tip of mandible. A strong symphyseal knob. Maxillary, in adults, about reaching vertical from posterior border of orbit, nearly half length of head. Teeth in broad bands on jaws, vomer, and palatines.

Interorbital space narrow, concave, with a pair of low ridges much diverging behind, its width  $2\frac{1}{3}$  in orbit. Eye large, equaling snout, 4 in head.

Head very rough, the spines compressed, knife-like, disposed in six well-defined series; the upper contains the nasal, the conspicuously projecting preocular, the supraocular, postocular, tympanic, occipital, and nuchal spines. The paroccipital ridge contains a single spine immediately behind orbit, and one at its posterior extremity; the bridge across cheeks is very strong, its ridge continued forwards onto preorbital bone and containing four very strong spines. Margin of preorbital with two diverging spines. Upper spine of preopercle very strong, in line with suborbital ridge, with a smaller spine at base; three other preopercular spines below this, directed downwards and backwards, the lower nearly obsolete in adults. No pit on occiput or below front of eye. Gill-rakers short and broad, about as high as wide, the longest about one-half diameter of pupil; seven in number on anterior limb of arch.

Dorsal spines weak, very low, the longest equaling diameter of orbit, the eleventh half this length. Soft dorsal short and high, its longest ray  $2\frac{1}{2}$  in head. Caudal truncate, its length equaling length of snout and eye. Anal spines not very strong, the second slightly longer and stronger than the third, its length equaling length of snout,  $1\frac{1}{2}$  in soft rays. Ventrals not reaching vent. Pectorals with narrow non-procumbent base, their width about equaling eye.

Scales large, thin, everywhere ctenoid, covering breast, cheeks, opercles, top of head, and a part of snout; wanting on maxillaries and mandibles.

Head with simple slender filaments, usually one to each spine. Each scale of sides with a fringe of minute filaments around edge.

*Color*: Light red, with irregular dark-greenish olive markings on upper half of sides. A blotch of same color below eye, one above opercular spine, and a few rounded spots on soft dorsal, more numerous on caudal. Lower side of head white. Buccal and gill cavities and peritoneum bright white.

Four specimens, the longest ten inches in length, from Stations 2996 and 3011, in 112 and 71 fathoms.

43. *Icelinus cavifrons* sp. nov.

Body not slender; the depth  $4\frac{1}{2}$  in length; the depth of caudal peduncle about one-third its length; head  $2\frac{3}{4}$  to 3.

Mouth small; the maxillary reaching but little beyond front of pupil  $2\frac{3}{4}$  to 3 in head.

Eyes large, equaling length of snout,  $3\frac{1}{2}$  in head.

Interorbital space narrow, groove-like; its width half diameter of pupil; nasal spines very strong, more than half width of pupil, without filament; supraorbital ridge ending above posterior margin of orbit in a strong spine as large as that on nasal bone. By the side of this, just behind eye, is another equally strong. Behind these spines the outline is suddenly broken by a deep circular pit, as large as pupil, bounded laterally and posteriorly by the short occipital ridges. Occipital spines strong; supraorbital flap well developed. No other conspicuous filaments in our specimens.

Upper preopercular spines strong, two thirds diameter of orbit, with one process directed backwards and three to five upwards. The usual three spines below this. A spinous point at lower angle of subopercle, and a short spine on shoulder.

Dorsal series of scales rather short, longer than head, extending from opposite fifth dorsal spine to base of third to last ray of soft dorsal. This series usually becomes single for a short distance posteriorly, and contains about nineteen in a series. A few scattered spinous plates behind axil of pectorals.

The two anterior dorsal spines are filamentous in males; not elevated in females; in our specimens extending when elevated to middle of soft dorsal.

D. X-14 or 15; A. 12 or 13. Lat. l. 38. L.  $3\frac{1}{2}$  inches.

Ground color varying with the surroundings from olivaceous to bright coral-red. A broad black bar below eye, and four across back; one under spinous dorsal, two under soft dorsal, and one across caudal peduncle. Belly white, the dark bars encroaching on region below lateral line. Males are darker than females, with black punctulations covering sides and below; the branchiostegal membranes, the lower two-thirds of pectorals, the ventrals and anal black. Spinous dorsal irregularly blotched or mottled with black. Soft dorsal, caudal, and terminal portion of pectorals (in females) with dark cross-bars.

Numerous specimens from Stations 2907 and 2945, in 44 and 30 fathoms.

KEY TO SPECIES OF ICELINUS.

- a. A pit-like depression on occiput; nasal, two postocular, and occipital spines, strongly developed; first two dorsal spines filamentous in the male. Postaxillary plates present. Dorsal series of plates scarcely reaching end of soft dorsal .....CAVIFRONS.
- aa. No pit-like depression on occiput.
  - b. First two dorsal spines filamentous, about equally produced. Dorsal series of plates much longer than head, reaching end of soft dorsal. Postaxillary plates present. Nasal filament present.....FILAMENTOSUS.
  - bb. First dorsal spine filamentous, the second little, if at all, produced. Dorsal series of plates usually shorter than head, not reaching middle of soft dorsal. No nasal filament. Postaxillary plates present.....TENUIS.

*bbb.* None of the dorsal spines filamentous. Postaxillary plates wanting. Dorsal series of plates more complete, extended posteriorly on back of caudal peduncle.

*c.* Nasal tentacle broad and palmate, with narrow stem-like base. Nasal, two postocular, and occipital spines present. Interocular space about half pupil. Supraocular filament usually fimbriate. Head  $2\frac{1}{2}$  in length.

FIMBRIATUS.

*cc.* Nasal tentacle simple, slender. Eye very large; interocular space very narrow, about one-fourth pupil. Maxillary reaching posterior border of pupil. No postocular or occipital spines. Head  $2\frac{1}{2}$  in length... OCULATUS.

*ccc.* No nasal tentacle. Head small, one-third length. Interocular space  $2\frac{1}{2}$  in pupil. Dorsal series of plates usually interrupted under posterior rays of soft dorsal, then continued on back of caudal peduncle. No postocular spine; nasal and occipital spines present..... QUADRISERIATUS.

#### 44. *Icelinus filamentosus* sp. nov.

Body shaped as in *I. quadriseriatus* but heavier, the depth  $4\frac{3}{4}$  in length; caudal peduncle two-thirds diameter of orbit. Mouth small, maxillary not reaching vertical from middle of pupil,  $2\frac{3}{4}$  in head. Teeth in broad bands on jaws, vomer, and palatines. Eye moderate,  $3\frac{7}{8}$  in head. Interorbital space not narrow, grooved, its width more than half diameter of orbit. Preopercular spine strong, three-fourths diameter of orbit, with a short terminal point and three or four strong upwardly directed barbs, curved slightly forwards. Below this three short simple spines directed downwards, and downwards and forwards.

Nasal spines strong; occiput with a broadly rounded ridge, ending behind in a rather blunt point. No pit behind eyes. No other spines on head. Gill membranes broadly joined, free from isthmus.

A simple slender filament at base of nasal spine, a conspicuous one on tip of maxillary, two on occipital ridge, three on preopercular margin, an inconspicuous one near base of opercular flap. A large black supraocular flap, about as long as diameter of pupil.

Body armed essentially as in *quadriseriatus*; the upper series of plates double throughout, beginning under third or fourth dorsal spine, and terminating under last dorsal ray, twenty-eight or thirty in each series. Thirty-six to thirty-seven plates in lateral line, their posterior borders occasionally with a slender white filament. Axil of pectoral with from two to six half-imbedded spinous plates. Skin otherwise smooth.

Fins large, the spinous dorsal with the first two rays produced into long slender filaments, which reach beyond middle of soft dorsal, and are much longer than head. The membrane between these is not incised, and they are not separated from rest of fin. Dorsals not connected, the longest ray of soft dorsal nearly half head. Pectorals not long,  $1\frac{1}{3}$  to  $1\frac{1}{2}$  in head. Ventrals about one-fifth head.

Head  $2\frac{6}{7}$  in length; depth  $4\frac{1}{2}$  to  $4\frac{1}{2}$ . D, X-16 or 17; A. 14 or 15. L. 9 inches.

*Color:* Olivaceous above, white below; a distinct black blotch under spinous dorsal, one or two diffuse blotches under soft dorsal, and sev-

eral along lateral line. Below lateral line an irregular series of small pearly spots, most distinct anteriorly. A dark bar vertically crossing cheeks. Gill membranes dusky. Pectorals black at base and on lower rays, upper part white with two irregular cross-bars. Ventrals dusky. Anal white, margined with black. Caudal with a dusky cross-bar at base and tip, mesially white. Dorsals translucent, narrowly edged with black, and with narrow oblique, somewhat irregular, dusky cross-bars.

Several specimens from stations 2893 and 2959, in 145 and 55 fathoms.

45. *Icelinus tenuis* sp. nov.

Body slender, tapering into a very slender caudal peduncle, whose depth is less than one-third its length, and half diameter of orbit.

Depth of body  $5\frac{1}{5}$  to  $5\frac{1}{2}$  in length. Maxillary reaching slightly beyond middle of orbit,  $2\frac{1}{5}$  in head. Bands of teeth narrower than usual, present on jaws, vomer, and palatines. Interorbital space narrow, half diameter of pupil, slightly concave posteriorly, the ridges converging anteriorly and meeting above front of pupil. Eye large, longer than snout,  $3\frac{1}{4}$  to  $3\frac{2}{5}$  in head. Upper preopercular spine smaller, about as long as pupil, with a short terminal process, and two or three upwardly directed ones. Below this a simple spine directed backwards, and two directed downwards and forwards. Nasal spines strong. Two strong spines behind upper edge of orbit, and a single sharp one at end of occipital ridge. Occipital region gently concave; no pit behind eyes. No spine on opercle or suborbital, and no distinct spine on shoulder.

A simple black flap on upper rim of orbit posteriorly. No other flaps on head, and usually none on plates of lateral line.

Plates of lateral line as in related species, forty-one in number. Dorsal series of plates arranged in a double row as usual, but very short, beginning under fifth dorsal spine and ending under first third of soft dorsal, its length varying from slightly longer than head to two-thirds its length, double throughout. Sides immediately behind axil of pectorals with about fifteen plates, similar to those of lateral line, but smaller, scattered or showing a tendency to regular arrangement. First ray of spinous dorsal very slender, filamentous, varying in length, in adults reaching end of soft dorsal. The second spine is sometimes slightly produced, but is never long. The two dorsals are entirely disconnected, the height of soft dorsal half or three-fifths length of head.

Pectorals long in males, reaching much beyond front of anal, as long as head. Ventrals nearly three-fourths orbit.

Head  $3\frac{1}{4}$  to  $3\frac{2}{5}$  in length; depth,  $5\frac{1}{5}$  to  $5\frac{1}{2}$ . D. X-17 to 19; A. 15 to 17. L.  $5\frac{1}{2}$  inches.

*Color*: Light olivaceous above, white below, the back with four black cross-bars, the first under spinous dorsal, the second and third under anterior and posterior parts of soft dorsal, the fourth at base of caudal. Back and sides, including head, with pearly dots and lines; those on upper parts frequently curved and margined with dark. Spinous dorsal with a small dark blotch posteriorly, and some dusky mark-

ings. Soft dorsal translucent, with broad oblique dusky bars. Caudal with the dusky basal bar continued on upper and lower rays at base. The basal half of fin translucent, its terminal portion with two or three blackish cross bars. Aanal black-edged in males. Ventrals black in males. Base and lower half of pectorals largely black in males, the terminal portion with pearly and dusky bars. Branchiostegal membranes black in males. A broad black bar below eye. Numerous specimens from stations 2893, 2946, 2959, 2977, and 2983, in from 45 to 150 fathoms.

46. *Icelinus fimbriatus* sp. nov.

Shape much as in *I. quadriseriatus*, the depth  $4\frac{3}{4}$  in length. Depth of caudal peduncle two-thirds of orbit.

Mouth larger, the maxillary reaching beyond middle of pupil,  $2\frac{1}{2}$  to  $2\frac{1}{2}$  in head. Teeth as usual. Nasal spines strong. Interorbital space narrow, grooved, half length of pupil. Eye  $3\frac{5}{8}$  to  $4\frac{1}{2}$  in head.

Preopercular spine very heavy, slightly more than half orbit, with a terminal tooth, and three upwardly directed processes. Two blunt spines behind eye, and another at end of occipital ridge. Three preopercular spines below the main one. No distinct spines on opercle or shoulder. A spine at lower angle of subopercle.

Conspicuous palmate tentacles on nasal spines and above and behind eye. Besides these, a number of simple or divided filaments on eyeball, occiput, preorbital, maxillary, preopercle, and along lateral line, the latter mostly in groups of three to five.

Plates on sides as in related species, thirty-six to thirty-eight along lateral line, thirty-two in upper dorsal series. The dorsal series become single behind dorsal fin, double elsewhere, beginning between third and fourth dorsal spines. No plates in axil.

None of the dorsal spines filamentous, the middle ones the longest, the soft rays still higher. Dorsal fins wholly separate.

Ventrals small, about two-thirds diameter of orbit. Pectorals short, about half head.

Head  $2\frac{1}{2}$  to  $2\frac{3}{4}$  in length. D. X-15 or 16; A. 12. L.  $5\frac{1}{2}$  inches.

*Color*: Olivaceous above, with about four irregular black bars, white below; middle of sides black, with larger or smaller roundish white spots. Lips black, crossed by narrow white streaks. Branchiostegal membranes blackish. Ventrals white, other fins all crossed with oblique or vertical black bars. Spinous dorsal largely black anteriorly and at tips of posterior spines. Pectorals largely black on basal portion of lower rays. Barbels white, except the supraocular, which are black.

Specimens taken at stations 2893 and 2975, in 145 and 36 fathoms.

47. *Icelinus oculatus* sp. nov.

Body elongate, depth  $5\frac{1}{4}$  in length, tapering rapidly backwards to the very slender caudal peduncle, whose least depth is  $2\frac{1}{2}$  in its length. Lower profile straight; head sharp anteriorly, the occipital ridges blunt,

the included space gently concave, not pit-like. Interorbital space very narrow, slightly concave posteriorly, with a median ridge in front, very strongly expanding over front of eye. Interorbital width two-sevenths of pupil. Eyes very large, equaling snout,  $3\frac{2}{5}$  in head. Mouth large, extending beyond vertical from pupil,  $2\frac{1}{4}$  in head. Teeth in rather narrow bands in jaws and on vomer and palatines.

Preopercular spine rather small, in the single specimen known, bifid at tip and with two strong antler-like processes directed upwards. The number of these latter varies in all known species, and is probably normally greater than two in this species. Below this, a weak spinous projection directed backwards, and two stronger ones downwards and forwards. A spinous point at lower angle of subopercle, none on occiput, shoulder, or opercle. Branchiostegal membranes and gill rakers as usual.

Head long,  $2\frac{2}{3}$  in length. D. X-16; A. 14. Lat. l. 39. L.  $5\frac{1}{2}$  inches.

Armature of sides as usual, the dorsal series of plates unusually well developed, extending from opposite second dorsal spine to beyond second dorsal, where the series becomes single, those of the two sides closely approximated. No scattered plates behind pectorals. An elongate, simple, supraorbital flap, a filament in connection with nasal spine, two on occipital ridge, and one on maxillary; a few filaments on plates of lateral line. None of the dorsal spines elevated; pectorals reaching slightly beyond origin of anal.

*Color*: As in *I. tenuis*, but the light spots on upper parts of body not elongate, and not dark margined. No conspicuous dark bar below orbit. The anal fin is translucent in our specimen, a female.

A single specimen from Station 2935, in 124 fathoms.

#### **Radulinus** gen. nov. (*Cottidae*).

Spinous dorsal short, the soft dorsal and anal very long. Branchiostegal membranes broadly united, posteriorly free from isthmus. No slit behind last gill. Broad bands of cardiform teeth on jaws, a single series on vomer, none on palatines. Preopercle with two short, simple spines. Ventrals, I, 3. Body very slender. Sides armed with a series of large, keeled, spinous plates along lateral line. Similar plates on head.

Type, *Radulinus asprellus* sp. nov.

#### 48. *Radulinus asprellus* sp. nov.

Body very elongate, the greatest depth at occiput,  $8\frac{1}{2}$  to  $9\frac{1}{2}$  in length,  $1\frac{1}{3}$  in width of head. Body subquadrate in cross-section, the upper angles being formed by the keel of lateral plates, tapering gently to the very slender flat caudal peduncle, everywhere as wide as, or wider than, deep. Mouth small, reaching front of pupil,  $2\frac{3}{4}$  in head. Eyes large, closely approximated, the interorbital space very narrow, not grooved, less than one-fourth pupil; orbit  $2\frac{2}{3}$  to  $2\frac{3}{4}$  in head.



Preopercular spines two only, short, simple, the lower directed backwards, the upper backwards and upwards. Nasal spines long and strong, a depression behind them; head otherwise smooth. Occiput not ridged.

A series of large, keeled, spinous plates along lateral line, running high on sides; their free edge is turned obliquely upwards, and armed with from one to several long spines mesially, and shorter ones above and below; a row of minute spinous plates along upper edge of series anteriorly. The series along lateral line is continued forwards on top of head, meeting its fellow in a V shaped patch filling posterior portion of interorbital space. Similar plates on snout and opercle, the head and body otherwise naked. In cross-section, the plates mark an abrupt angle, the back being flat, the sides vertical.

Head  $4\frac{1}{4}$  to  $4\frac{1}{5}$  in length; depth,  $8\frac{1}{2}$  to  $9\frac{1}{2}$ ; D. VIII to X-21 or 22; A. 23 or 24. Lat 1, 38 to 40. Length, 5 to 6 inches.

Dorsal spines slender, the two fins well separated. Rays of soft dorsal and anal very slender, rather long. Caudal truncate or rounded, two-thirds head. Pectorals with eighteen or nineteen rays, the lower much shortened, but scarcely thickened, as long as head. Ventrals long and slender, with one spine and three well developed rays, reaching to or nearly to vent. Anal papilla very long in males, more than one-third head.

*Color*: Light olivaceous, with a series of elongate, narrow, brown streaks along middle of sides, the latter also finely punctate with black. A dark streak in front of eye. Fins translucent, the dorsals, pectorals, and caudal, with some black spotting, which shows a tendency to form bars. Anal and ventrals white.

Numerous specimens, from stations 3046, 3057, 3058, and 3059, in depths of from 43 to 77 fathoms.

#### **Bathyagonus** gen. nov. (*Agonidae*).

Spinous dorsal developed. Lower jaw the longer. Plates of body spinous. Gill membranes united to the isthmus, not forming a fold across it. Teeth well developed on jaws, vomer, and palatines. Pectorals not notched, the upper rays the longest, the lower becoming regularly shortened. Bones of head thin and yielding, the system of mucous canals very strongly developed.

Type, *Bathyagonus nigripinnis* sp. nov.

#### 49. *Bathyagonus nigripinnis* sp. nov.

Body exceedingly slender, depressed, everywhere as wide as or wider than deep. Snout wide, flattened, transversely depressed in front of eyes, its width more than twice its greatest depth.

Eyes large, the orbit  $2\frac{2}{5}$  in head. Interorbital space  $3\frac{1}{2}$  in orbit, grooved, with a pair of ridges.

Mouth somewhat oblique, the lower jaw distinctly projecting, the maxillary scarcely reaching front of orbit, equaling length of snout,  $3\frac{1}{2}$  in head. The snout shows a narrow bony ridge, but is otherwise covered with thin membrane.

Teeth not strongly developed, in narrow bands in jaws, and on vomer and palatines.

Nasal spines small; a movable plate on tip of snout, bearing three small, backwardly-diverging spines. One supraocular spine, two on occipital ridge, two on paroccipital ridge, two on preopercular margin, and one or two on bony bridge across cheeks. Two or three bony plates below this bridge, each with a central spine. The bony ridge, as well as mandible and horizontal limb of preoperculum, is deeply excavated below for mucous canals, and contains very large mucous pores. Ridges on head usually finely serrulate. Branchiostegal membranes very broadly joined to isthmus, without fold. Usually a single bony plate on the membranes mesially. A single minute black barbel on tip of maxillary; none others on head.

Plates arranged as usual, all spinous except medium series on caudal peduncle below. Seven plates in front of dorsal, nine under spinous dorsal, four between dorsals, seven under soft dorsal, eighteen on back of tail. Lat. l. 44.

Plates on breast subangular, regularly arranged, the plates of the three medium series each with a crest and a spine. Breast with twenty-five to thirty plates. Two or three plates on membrane behind symphysis of lower jaw.

Head  $4\frac{1}{2}$  in length; depth  $2\frac{2}{3}$  in head. Caudal peduncle  $2\frac{1}{2}$  in length. D. VII-6 or 7. A. 7. V. I. 2. L. 6 inches.

Distance of dorsal from nape equals length of head behind pupil. Distance between dorsals equals diameter of orbit. Origin of anal under interspace between dorsals. Caudal posteriorly rounded, the median rays longest, slightly less than half head. Pectorals not notched, the uppermost rays longest, regularly shortened below. The rays all simple, none of them thickened, the longest  $1\frac{2}{5}$  in head. Ventrals very short, two-thirds diameter of orbit.

*Color*: Light above, blue-black on lower side of head; breast and belly dusky below posteriorly. All fins intense blue-back.

Many specimens from station 3073, in 477 fathoms.

#### **Xenochirus** gen nov. (*Agonidae*).

Spinous dorsal present. Jaws equal, or the upper the longest. Plates of body spinous. Gill membranes united to the isthmus, the posterior edge sometimes forming a very narrow free fold across the throat. Teeth well developed on jaws, vomer, and palatines. Pectorals divided by a deep notch into two portions, the lower composed of greatly thickened rays which are simple and frequently longer than those of upper lobe. A series of small spines on eyeball above pupil.

Type, *Xenochirus triacanthus* sp. nov.

50. *Xenochirus triacanthus* sp. nov.

Characterized by its long snout, bearing three spines, its small eyes, the gill membranes without free fold, the cheeks with plates below the bony bridge.

Head  $4\frac{5}{8}$  to 5 in length; depth slightly less than half head. Eye 3 in head. Maxillary  $3\frac{3}{4}$  in head. D. V or VI-6 or 7; A. 6, P. 13, V. 1, 2. Lat. l. 41. Length 7 inches.

Interorbital space narrow, ridgeless, channeled,  $3\frac{1}{2}$  in orbit. Snout long, less depressed than usual behind the nasal spines,  $3\frac{1}{2}$  in head, its length equaling its greatest width. Mouth horizontal, the lower jaw but slightly included, the maxillary not reaching vertical from front of orbit,  $3\frac{3}{4}$  in head. Teeth in broad bands in jaws and on vomer and palatines. Two nasal and one terminal spine on snout, well developed, the widely triangular base of the latter only slightly overhanging premaxillaries. Three to five spines on eyeball. A supraocular spine present, two on occipital ridge, one on paroccipital ridge, two on preopercular margin, the lower broadly triangular, but with spine-like tip. One spine on bridge across cheeks. Three plates, with centrally radiating striæ, but without spines, below bony bridge across cheeks.

Gill membranes broadly joined to isthmus, without free fold. Five or six small bony plates mesially on branchiostegal membranes.

Two or three long thick barbels at tip of maxillary, and three smaller pairs on lower side of mandible.

Distance from front of dorsal to nape equals length of head behind front of eye. Distance between dorsals,  $1\frac{1}{2}$  in orbit. Caudal truncate, about half head. Pectorals deeply notched, the four lower rays thickened, the two upper of these elongate,  $1\frac{1}{4}$  in head. Ventrals short,  $2\frac{1}{2}$  in head.

Plates spinous, and arranged as usual; seven before dorsal, seven under spinous dorsal, two between dorsals, seven under soft dorsal, sixteen or seventeen on back of tail. Lat. l. 41. Plates covering breast subangular, the center little elevated, not spinous, weakly striate.

*Color*: Olivaceous, with traces of darker cross-bars on back. Fins white or somewhat dusky, unmarked, the dorsal not black-margined.

From stations 2893, 2973, and 3059, in 145, 68, and 77 fathoms.

51. *Xenochirus pentacanthus* sp. nov.

Head  $4\frac{3}{4}$  in length; depth  $2\frac{1}{2}$  in head. D. VII-7; A. 8. V. I, 2; P. 15. Length,  $6\frac{1}{2}$  inches.

No decided pit on nape or occiput, the region behind eyes and behind occiput slightly depressed and concave. Eye large, longer than snout, 3 in head. Interorbital area narrow, grooved, with two low ridges, its width one-fourth diameter of orbit. Snout rather long,  $3\frac{1}{2}$  in head, flat, the area behind nasal spines much depressed, concave.

Mouth horizontal, the jaws equal, the maxillary scarcely reaching

vertical from front of eye,  $3\frac{3}{5}$  in head. Teeth small, in broad bands on jaws, vomer, and palatines. Gill membranes broadly united across throat, joined mesially to isthmus, and without free fold. Anterior nostril with a short tube and without flap.

Nasal spines strongly developed. In front, on tip of snout, a small broadly-triangular movable plate, bearing three spines diverging backwards, much smaller than nasal spines, and not overhanging premaxillary. A pair of spines on sides of snout behind nostrils, two posteriorly on suborbital process, one or two on a line with latter on preopercular margin. A large spine at upper posterior margin of orbit, two on occipital ridge, and four on a lateral ridge behind eye, the latter including spine on shoulder. A few other spines on head. A row of usually four backward-directed spines on eyeball above pupil. Below the bony bridge across cheeks a row of three tubercular plates, each, or the two last, bearing a backward-directed spine.

Two long barbels on end of maxillary, and one below on each side of mandible.

Distance of front of dorsal from nape equals length of snout and eye. Distance between dorsals equals diameter of orbit. Front of anal under interspace between dorsals. Pectorals deeply divided, the lower four or five rays greatly thickened, in adults longer than the upper rays, separated from them by a notch. Ventrals one-third head. Pectorals  $1\frac{1}{3}$  in head. Caudal truncate, about half head.

Plates covering breast rather large, subangular, not spinous, each with lines radiating from the elevated center. Plates on sides strongly spinous, the series arranged as usual, with a dorsal and a ventral pair becoming single on caudal peduncle, and two lateral pairs. Eight plates in front of dorsal fin, nine along basis of spinous dorsal, three between dorsals, eight under soft dorsal, and sixteen on caudal peduncle. Lat. line 43.

*Color* : Dusky, without conspicuous markings, with four or five faint dusky cross-bars on back; a blackish blotch in axil. Caudal black, narrowly white-edged. Dorsals dusky, darker towards tips, the soft dorsal narrowly white-edged. Pectorals dusky. Ventrals white.

Several specimens from station 3076, in 178 fathoms.

#### 52. *Xenochirus latifrons* sp. nov.

Differing from other species in the very short snout, the large eye, the three spines on snout, and in the branchiostegal membranes, which are free posteriorly.

Head,  $4\frac{2}{5}$  in length; depth half head. Eye  $2\frac{1}{2}$  to  $2\frac{3}{4}$  in head. D. VI or VII, 7; A. 7 or 8, V. I, 2, P. 14 or 15. L. 6 inches.

Interorbital space narrow, deeply channeled, without ridges,  $3\frac{2}{5}$  in orbit. Snout short,  $3\frac{1}{4}$  to 4 in head, broadly triangular, with a notable depression between nasal spines and front of eyes. Mouth slightly oblique, the lower jaw a little included, the maxillary reaching vertical

between front of eye and pupil,  $3\frac{1}{2}$  in head. Teeth in broad bands on jaws, vomer, and palatines.

Nasal spine very strong. A strong spine of nearly equal size on a movable triangular plate at tip of snout, slightly overhanging front of premaxillaries. Supraocular and occipital spines strong, single; a small spine terminating the paroccipital ridge. A slight groove behind eyes and one on nape. A spine on preopercular margin and one on bridge across cheeks. No plates on cheeks below this. No other spines on head.

Branchiostegal membranes broadly joined, united to isthmus, forming a narrow free margin posteriorly nearly as wide as interorbital space.

Eye with a series of 3 to 5 backward-directed spines, bounding pupil above. Opercle scarcely striate.

A single long barbel at tip of maxillary. Two pairs of shorter filaments on lower surface of mandible.

Distance from front of dorsal to nape equals length of snout and eye. Distance between dorsals about  $1\frac{1}{2}$  in orbit. Front of anal under middle of interspace between dorsals. Pectorals partially divided, the lower four or five rays separated by a notch from rest of fin, thickened and elongate,  $1\frac{1}{5}$  in head. Ventrals  $2\frac{1}{3}$  in head. Caudal truncate, half length of head.

Plates spinous, arranged as usual. Seven plates before dorsal, seven under spinous dorsal, two between dorsals, seven under soft dorsal, fourteen on back of tail. Lat. l. 39. Plates on breast oval, with raised center and striate, without spines.

*Color*: Dusky olive, light below, back with five or six faint darker; cross-bars. Axillary region blackish. Soft dorsal and caudal with the rays black. Spinous dorsal with a conspicuous jet-black margin. Pectorals somewhat dusky above. Ventrals white.

Abundant; taken at stations 2898, 2935, 2948, 2972, 2973, and 3059, in 61 to 158 fathoms.

### 53. *Paraliparis rosaceus* sp. nov.

Body slender, covered with lax skin, which invests also the fins. Head small,  $5\frac{2}{3}$  in length; depth,  $4\frac{3}{4}$ . Mouth transverse, nearly horizontal, the maxillary scarcely vertical from front of pupil, equaling length of snout,  $3\frac{1}{4}$  in head; eye half interorbital width, 5 in head.

Teeth in lower jaw pointed, in a single close-set series, their even tips forming an almost uniform cutting edge. Teeth in upper jaw apparently paved, the jaw presenting a smooth, rounded surface, on which the teeth are little evident, but occasionally present sharp projecting points. Lower jaw included.

A series of conspicuous mucous pores on snout, mandible, and on preopercle. Gill opening a narrow slit above base of pectorals.

Pectoral fin divided into two wholly distinct lobes not connected by

intervening rays, a space without rays present, equaling diameter of pupil. The lower lobe consists of four rays, the longest three-fifths head, inserted under preopercular margin. The main portion of the fin consists of about fifteen rays and is but slightly longer than the lower lobe; dorsal beginning behind middle of pectorals, its distance from tip of snout  $4\frac{1}{6}$  in length; distance of origin of anal from tip of snout equaling one-third standard length.

Vent under base of upper pectoral rays, but wholly behind base of lower lobe of pectorals, its distance from tip of snout equaling length of head and equaling also its distance from origin of anal. No trace of ventral disk or fins.

D. 58; A. 53.

*Color:* Light rose-red, the fins and head largely jet black. Abdomen behind vent blackish. Peritoneum and lining membranes of mouth and gill-cavity jet black.

A single specimen,  $5\frac{1}{3}$  inches long, from station 2919, in 984 fathoms.

54. *Gobiesox pinniger* sp. nov.

Head  $2\frac{2}{5}$  to  $2\frac{3}{5}$  in length; width of body  $4\frac{1}{5}$ ; of head, 3 in length. D. 16 or 17; A. 8 or 9.

Interorbital width  $3\frac{1}{4}$  in head; eye half interorbital width; width of mouth  $1\frac{3}{5}$  to  $1\frac{3}{4}$  in head. L.  $2\frac{1}{4}$  inches.

Teeth in upper jaw conic, acute, in several series, the anterior row in front enlarged, unequal. In lower jaw the teeth mesially in two distinct series, those in middle of anterior row narrow entire incisors, those laterally conic, canine-like.

No evident opercular spine.

Disk about as broad as long, its length about that of head.

Front of dorsal varying in position, about midway between snout and base of caudal, its length about half that of body. Vent nearly equidistant between disk and front of anal, the base of latter  $3\frac{1}{2}$  to  $3\frac{3}{4}$  in body. Caudal  $1\frac{1}{2}$  to  $1\frac{3}{4}$  in head. Pectorals about one-third of head, with a distinct fold at base.

Color variable. Anteriorly usually with reticulating dark lines surrounding yellowish spots. A narrow dark streak forward, one downward, and one backward from orbit. Below dorsal fin about six dark bars running obliquely downward and backward, these sometimes in greater number, frequently more or less irregular and interconnected, often divided by vertical streaks or series of dots. Body sometimes light in spirits, without distinctive markings. Vertical fins usually dusky, narrowly margined with white, sometimes lighter with dark margins.

Abundant in the Gulf of California. Specimens taken at Puerto Refugio, Angel Island, San Luis Gonzales Bay, and La Paz.

55. *Gobiesox funebris* sp. nov.

Body rather slender, its width 5 in length. Width of head  $3\frac{1}{2}$  to nearly 4.

Head  $2\frac{3}{4}$  to 3 in length; depth half head. D. 9; A. 6 or 7. L.  $2\frac{1}{2}$  inches.

Teeth in upper jaw conical, in several series, unequal but without canines. In lower jaw mesially in two series, the outer of narrow entire incisors, truncate or rounded, without lateral canines. Interorbital space wide, 3 in head, the eye small,  $\frac{2}{3}$  interorbital width. Mouth very wide, half or more than half length of head. Ventral disk wider than long, its length  $1\frac{1}{2}$  to  $1\frac{3}{4}$  in head. No evident opercular spine.

Distance from front of dorsal to base of caudal  $2\frac{2}{3}$  to 3 in length anterior to dorsal. Distance from vent to front of anal fin  $1\frac{1}{2}$  to  $1\frac{2}{3}$  in its distance to disk. Base of dorsal from  $1\frac{1}{2}$  to  $1\frac{1}{4}$  in head; base of anal about half head. Caudal rounded,  $1\frac{2}{5}$  to  $1\frac{3}{4}$  in head; pectorals  $3\frac{1}{2}$  in head.

*Color:* Varying from dark olive-brown to black, everywhere covered with fine yellowish vermiculations, usually arranged to form narrow lighter bars on the sides. Three or four obscure dark streaks radiating from the eye. Blackish below, the fins varying from blackish to straw-color.

Abundant at Puerto Refugio (Angel Island) and La Paz.

56. *Gobiesox humeralis* sp. nov.

Body of moderate width, the head not evenly rounded anteriorly, becoming contracted opposite eyes, the snout forming a quadrate projection beyond the profile, as seen from above. Head wider than body. Width of body  $4\frac{1}{4}$  in length, of head  $3\frac{3}{4}$ .

Teeth in a single series in each jaw, the anterior narrow incisors, trilobate at tip, the two posterior teeth on each side strong conical canines, somewhat recurved. About twelve incisors in the upper jaw.

Interorbital space very wide, about equaling width of mouth,  $2\frac{1}{3}$  to  $2\frac{1}{2}$  in length of head. Eye very small, 3 in interorbital space. Head 3 to  $3\frac{1}{2}$  in length.

Ventral disk as wide as long, its length  $1\frac{1}{4}$  in head. No evident opercular spine. Distance from front of dorsal to base of caudal 3 in length anterior to dorsal. Base of dorsal  $1\frac{2}{3}$  in head, of anal half head.

D. 8 or 9; A. 7.

Distance from vent to front of anal half its distance from disk. Caudal broadly rounded,  $1\frac{3}{4}$  in head. Pectoral one-third head, without distinct fold of skin across it.

Ground-color, dark olive-brownish, crossed by many carmine-red bars, these somewhat broken anteriorly and above, to form reticulating lines, posteriorly and on lower part of sides more regular and running obliquely downwards and backwards. A conspicuous round humeral

spot, larger than eye, in life black with golden green reflections. Numerous streaks from eye backwards across cheeks and opercles.

Abundant at Puerto Refugio (Angel Island). A few specimens seen at La Paz.

57. *Gobiesox eigenmanni* sp. nov.

D. 4; A. 5. Head  $3\frac{2}{3}$  in length; depth about half head.

Body very slender and narrow, the width of head  $4\frac{4}{5}$  in length, width of body 6.

Mouth wide, the distance between its angles half length of head, the maxillary scarcely reaching vertical from front of orbit. Interorbital space wide, about half head. Eyes very small, about 3 in interorbital width.

Teeth in upper jaw conic, acute, in several series, the anterior in upper jaw enlarged. Teeth in lower jaw also in several series, those of front row narrow incisors, entire, with rounded or truncate edges.

Disk very small and narrow, its width about two-thirds its length, the latter  $1\frac{2}{3}$  in length of head.

Fins all small, the base of dorsal two-fifths length of head, less than free portion of caudal peduncle. Distance from origin of dorsal to base of caudal  $3\frac{1}{3}$  in length before dorsal. Distance from vent to front of anal fin  $1\frac{3}{5}$  in its distance from disk. Caudal broadly rounded, its length  $1\frac{4}{5}$  in head. Pectoral somewhat pointed, about half head.

Coracoid plate small, about half height of pectoral and less than half its length.

*Color:* Uniform light olive-green, without distinctive markings.

A single specimen, about 1 inch long, was taken at Point Loma, near San Diego, California. Other specimens were taken some years since at San Cristobal Bay by Mr. C. H. Townsend, and are referred to under the name of *G. rhessodon* in the Proceedings U. S. National Museum, volume 7, page 553.

58. *Gobiesox papillifer* sp. nov.

D. 13; A. 9. Head  $2\frac{3}{5}$  in length; width of body  $3\frac{2}{3}$ ; width of head  $2\frac{4}{5}$ .

Width of mouth  $1\frac{4}{5}$  in head; interorbital width 3. Eye half interorbital width.

Teeth in upper jaw conic, acute, very small, in two or more series, two of them slightly enlarged, canine-like. Teeth in lower jaw in two series, the outer anteriorly, narrow entire incisors, with rounded tips, becoming conical laterally.

Opercular spine sharp, evident, though not projecting through the integument.

Lips and lower side of head anteriorly with fleshy papillæ.

Disk about as broad as long, its length  $1\frac{1}{5}$  in head.



Distance from front of dorsal to base of caudal  $1\frac{1}{2}$  in its distance from tip of snout. Vent exceptional in position, immediately in front of anal fin. Base of anal  $1\frac{3}{4}$  in head. Caudal rather acute,  $1\frac{2}{3}$  in head. Pectorals  $2\frac{2}{3}$  in head, a distinct fleshy fold at base.

In spirits, uniform dark olivaceous, lower side of head and disk light. Pectorals dusky. Vertical fins with a black bar at base, then a white bar, followed by a wide, dusky area, and narrowly margined with white. Caudal with all these marks except the black bar, having the posterior outlines curved, following margin of fin.

One specimen,  $1\frac{1}{2}$  inches long, from Magdalena Bay, Lower California.

59. *Bathymaster hypoplectus* sp. nov.

Differing from both *B. signatus* and *B. jordani* in the broadly united gill membranes, and from *signatus* in the scaly cheeks, the smaller scales, etc.

Head  $4\frac{2}{3}$  in length; depth 7. D. 46; A. 33. Length about 8 inches.

Head and body compressed elongate, the anterior profile of head compressed, declivous. Mouth somewhat oblique, at lower side of snout, small, the maxillary reaching vertical from middle of pupil,  $3\frac{1}{6}$  in head. Snout very slightly shorter than orbit,  $4\frac{1}{3}$  in head; diameter of orbit 4 in head. Teeth well developed, in broad bands on jaws, vomer, and palatines, the vomer and palatine patches nearly continuous.

Branchiostegal membranes broadly united, free from isthmus, forming a fold whose depth exceeds half diameter of orbit. Margin of preopercle adnate behind, slightly free below, furnished with a series of six conspicuous mucous pores. Head without spines, ridges, or filaments. Inner margin of shoulder girdle conspicuously notched above and below, but without hook. Gill rakers tubercular, few in number. A well-marked slit behind last gill.

Distance from nape to front of dorsal fin equals its distance from posterior border of eye. Anterior ten or twelve dorsal rays simple and apparently not articulated, but flexible and not spine-like. Distance from front of anal to base of ventrals  $2\frac{1}{3}$  in its distance from base of caudal. All but first third of dorsal rays, and all of anal rays forked at tip; dorsal not high, the longest rays half head; highest anal ray equals snout and half eye. Last dorsal and anal rays entirely disconnected from caudal, leaving a free space on caudal peduncle one-half diameter of orbit.

Ventrals 1, 5, in advance of base of pectorals, narrowly triangular, the inner rays longest. Pectorals with curved base running backwards and downwards, the rays all branched, eighteen in number; the width of base of fin  $3\frac{1}{4}$  in head, the longest ray  $1\frac{1}{3}$  in head. Caudal rounded, two-thirds length of head.

Body covered with small, partially embedded, cycloid scales, including antedorsal region, belly, breast, and area in front of base of pec-

torals. Cheeks covered with similar but smaller scales, the opercles and rest of head naked. Lateral line running high, parallel with back, on a series of enlarged scales, which are also partly embedded in the thick skin. The lateral line fails to reach base of caudal by a distance equaling one-half of head, and is present on eighty-two scales.

*Color*: Dark olive-brown above, lighter below; a series of about twelve quadrate dark blotches below lateral line, connected more or less by dusky streaks with an alternating series along base of dorsal. No bright colors. Dorsals, pectorals, ventrals and branchiostegal membranes dusky straw-color. Anal black, the rays white-tipped. Caudal blackish. Peritoneum white.

A single specimen from station 2944, in 30 fathoms.

**Gillellus** gen. nov. (*Leptoscopidae*).

A separate dorsal fin on the nape composed of three spines. Lateral line descending posteriorly, its dorsal and median portions about equal. Fringes of upper lip obsolete, those of lower lip little evident. Head not cuboid, the mouth moderately oblique, the lower jaw rounded in front, and without symphyseal flap.

The physiognomy is intermediate between *Dactyloscopus* and *Myxodagnus*, from both of which the genus is well separated by the characters of the dorsal fin and the lateral line. Named in honor of Dr. Theodore Gill, to whom we owe our knowledge of the previously described members of this most interesting group.

Type, *Gillellus semicinctus* sp. nov.

60. *Gillellus semicinctus* sp. nov.

Body deep, tapering rapidly either way from front of dorsal. Depth  $5\frac{1}{2}$  in length; head  $3\frac{2}{3}$ . Mouth moderately oblique, the maxillary extending beyond orbit, 3 in head. Tip of lower jaw projecting.

Teeth in a narrow band in front of jaws, becoming a single series laterally; none of the teeth enlarged. Opercular fringes well developed, eight or nine in number. Fold of membrane between rami of lower jaw well developed. Pseudobranchiæ apparently not developed. Gill rakers obsolete.

Dorsal fin beginning at a distance from occiput less than diameter of eye. The first three rays are entirely detached from the rest of the fin, the first ray the highest, the second and third shortened. Of the remaining part of the fin, the first nine or ten rays are unarticulated and spinous. First two anal rays not articulated. Caudal about  $1\frac{3}{4}$  in head. Pectorals  $1\frac{1}{2}$ .

D. III-IX or X, 28; A. II, 30 or 31. Lat. l., 25 to 28-3-15 to 18 (43 to 49 scales in all).

Lateral line running anteriorly along the very base of spinous dorsal, no scales intervening between it and base of fin. It descends to

middle of sides posteriorly; the median portion of its length shorter than the dorsal portion.

*Color*: Light olivaceous, the back with six broad cross-bars of pink, narrowly margined behind and in front with blackish, terminating below on middle of sides. The lower of these bars is frequently black. A black bar across caudal peduncle, and sometimes a black line at base of caudal. Along median line of sides frequently a series of small black spots alternating with the cross-bars. A similar series along median dorsal line. A large pink blotch covering occiput. A dusky bar across interorbital space, running downwards and backwards across cheeks. Silvery spots and blotches on cheeks and anterior portions of opercles. Fins unmarked.

Specimens have been obtained in the Pacific by the *Albatross*, at Stations 2827 and 2829, and by the *Grampus* in the Atlantic, at Stations 5108 and 5112. I am unable to detect any specific difference between the two.

#### 61. *Gillellus arenicola* sp. nov.

Body very slender and elongate, much as in *Myrodagnus*, the snout sharp, the mandible produced at symphysis and conspicuously projecting.

Labial fringes apparently obsolete. Maxillary reaching vertical from middle of orbit. Eye small, about equaling length of snout, 6 in head. Opercular fringes nearly obsolete, three or four small ones at upper edge of opercle.

Anterior dorsal inserted close behind occiput, composed of three rays, and separated by a short interspace from rest of fin. Pectorals longer than head.

Head  $4\frac{2}{3}$  in length; depth  $8\frac{3}{4}$ . D. 3-40; A. II, 35. Lat. l. 18-3-27.

The lateral line anteriorly runs along base of dorsal, from which it is not separated by intervening scales. The anterior portion is contained  $2\frac{1}{3}$  times in the posterior median portion.

*Color*: Light olivaceous, the head with grayish blotches and small pearly spots. Eleven dark bars downwards from back, the alternate ones narrower and fainter and not extending to middle of sides, as do the others. The margins of the larger bars are darker than the median portion. The bars are not continued onto dorsal fin; all the fins translucent.

A single specimen,  $1\frac{1}{2}$  inches long, from Cape San Lucas.

#### 62. *Dactyloscopus lunaticus* sp. nov.

Depth greater than in related species,  $5\frac{1}{4}$  in length; head (to end of opercular fringes)  $3\frac{2}{3}$ ; from tip of lower jaw to base of fringes 4. Head cuboid, narrowed forwards, the vertex gently convex; width at occiput half length of head (to base of fringes on opercle). Mouth nearly vertical, maxillary  $2\frac{2}{3}$  in head. Labial fringes short but evident. A short nasal filament.

Teeth in a rather broad cardiform band on front of upper jaw, becoming narrow laterally. In lower jaw a single series, or an irregular double series anteriorly. Vomer and palatines toothless.

Eyes small, very close together, the interorbital width about half their diameter, which equals length of snout, and is about one-eighth head. Gill laminae much reduced in size; a small round pore behind inner arch. Gill rakers obsolete; pseudobranchiae small but evident. Opercular fringes composed of eighteen filaments.

Dorsal beginning at a distance behind occiput equaling diameter of orbit. The anterior rays are but partly joined by membrane, the first ten or eleven slender and not articulated. The last ray is distant from base of caudal about a diameter of orbit. Origin of anal under sixth dorsal spine, the two anterior rays not articulated. Pectorals short,  $1\frac{2}{3}$  in head, containing fourteen or fifteen rays. Caudal very small, with ten developed rays, its length  $2\frac{3}{4}$  in head.

D. X or XI, 29 or 30; A. II, 32 or 33; lateral line running high in its anterior portion, declining on three or four scales, the posterior portion on middle of sides with twenty-nine or thirty tubes. Four scales between median portions of lateral line and base of dorsal.

*Color*: Light olivaceous, a dark streak along back, one along middle of sides, and a fainter one along base of anal, formed by darker margins to the scales. Median dorsal line with ten or eleven more or less evident narrow pearly white cross-bars. Top of head and front of mandible colored like the back, the pearly blotches varying in size and shape, but symmetrically arranged, many of them narrowly edged with black. Nasal tentacle white. White streaks on preopercle. Caudal with a narrow black bar at base.

Three specimens, the longest 3 inches, from Stations 2797 and 3012, the latter in 22 fathoms.

#### 63. *Labrosomus cremnobates* sp. nov.

Differing from other described species of this genus in the much larger scales. Head  $3\frac{1}{2}$  in length; depth  $4\frac{3}{4}$ . D. XXI or XXII, 8; A. II, 19, Lat. 1. 37. L.  $1\frac{1}{2}$  inches.

In appearance resembling very strongly the species of the genus *Auchenopterus*. Body slender, snout sharp, the jaws equal. Mouth wide, oblique, the maxillary reaching vertical from posterior margin of orbit,  $2\frac{1}{4}$  in head.

Teeth small, villiform, forming a band in front of upper jaw, the outer series enlarged. In lower jaw a single series laterally, becoming double in front. Similar teeth on vomer and palatines. Eye longer than snout, 4 in head. Interorbital width less than diameter of pupils. Opercle terminating in an evenly convex process behind, without spinous points. Gill membranes broadly united, free from isthmus. No hook on inner edge of shoulder girdle. Nostrils with a flap. A single slender filament on eye and one or more on each side of the nape.

A slight notch between first and third dorsal spines and another between the eighteenth and twenty-first spines. The spines are low and strong, the highest equaling the snout and half eye. Soft rays higher, the longest equaling half head. Caudal short, rounded, entirely free from dorsal and anal. Anal similar to soft dorsal; the first two rays spinous. Ventrals inserted well in advance of pectorals, each consisting of one spine and two soft rays, which are joined only at base. Pectorals pointed, the lower rays the longest,  $1\frac{1}{4}$  in head.

Scales large, cycloid, the lateral line running high in front, descending to middle of sides immediately behind pectorals, thence running straight to tail. In the types, which are probably immature, the pores are not developed on posterior part of body.

*Color in spirits:* Uniform light olivaceous, a small dusky spot behind orbit and one below and behind it. Opercle dusky. In one specimen the rays of soft dorsal, anal, and caudal are finely barred with dusky.

Two specimens. Station 3001; in 71 fathoms.

#### **Cryptotrema** gen. nov. (*Blenniidae*).

Differing from *Labrosomus* in the absence of nuchal filaments and in the modified anterior portion of the lateral line, which runs on a series of enlarged scales having no externally visible pores.

Type, *Cryptotrema corallinum* sp. nov.

#### 64. *Cryptotrema corallinum* sp. nov.

Body elongate, the greatest depth  $5\frac{1}{2}$  in length, regularly tapering backwards to caudal peduncle, whose depth equals length of snout. Head  $3\frac{1}{2}$  to 4 in length, the snout sharp, the mouth nearly horizontal, the maxillary reaching middle of eye or beyond,  $2\frac{1}{3}$  to  $2\frac{1}{2}$  in head. Teeth strong, but none of them enlarged, in a single series in jaws laterally, becoming double anteriorly. Teeth on vomer and in a small distinct patch on front of palatines.

Eyes large, the interorbital space flat, nearly half diameter of orbit. Orbit slightly exceeding length of snout,  $3\frac{1}{2}$  in head. Brauchiostegal membranes broadly united, free from isthmus, the posterior edge on vertical from preopercular margin. Anterior nostril in a short tube, a slender flap arising from its posterior margin. A pair of simple slender filaments arising from the upper edge of each orbit, one on each side of nape; none others on head. Gill-rakers very short and weak. Shoulder girdle without hook on its inner edge.

Scales rather large, cycloid, the head alone naked; lateral line in its upper anterior portion without externally visible tubes, its position shown by a series of enlarged scales twice the size of the others. On these the tubes are wholly on the under side, each opening anteriorly by a single pore under the edge of the preceding scale. Anteriorly the lateral line runs near the back and parallel with it, becoming suddenly declined behind middle of trunk, thence running on middle of

sides. The oblique portion of lateral line rests on about seven scales, and the externally visible tubes of lateral line begin at this point. Posterior portion of lateral line contained  $1\frac{1}{2}$  to  $1\frac{3}{4}$  in dorsal portion. Scales of lateral line: Forty-five in dorsal portion, seven in oblique portion, and eighteen in posterior portion.

A slight notch behind fourth dorsal spine, the second and third spines slightly longer than those following, the first little longer than the fourth, the longest spine about  $2\frac{1}{4}$  in head. First two anal rays spinous, but weak and flexible. Last dorsal and anal rays not joined by membrane to caudal peduncle, the depth of the latter equaling the length of its free portion. Ventrals long and narrow, nearly reaching vent in males, consisting of one spine and three simple rays. Pectorals with some of the lower rays longest,  $1\frac{1}{5}$  in head.

All of pectoral rays simple, fourteen in number.

D. XXVII, 12; A. II, 27. L. 5 inches.

Caudal fin truncate,  $1\frac{2}{5}$  to  $1\frac{1}{2}$  in head.

*Color*: Dusky olive above, with irregular narrow longitudinal streaks of bright coral red, and seven round black blotches above middle of sides. Reticulating red lines and spots on top and sides of head and snout. Branchiostegal membranes dusky in males. Two red streaks on base of pectorals. Dorsals somewhat dusky, marked with lines of red spots. Caudal with three rather faint cross-bars. Pectorals, ventrals, and anal largely black in males, pale in females.

Three specimens from station 2945, in 30 fathoms.

#### **Plectobranchnus** gen. nov. (*Blenniidae*).

Teeth conic, on jaws, vomer, and palatines, some of them canine-like. Body scaly; lateral line obsolete, its course indicated by a lighter streak on middle of sides. Gill slits not continued far forward, the membranes broadly united, wholly free from isthmus. Dorsal of spines only. Anal with two spines. Ventral with one spine and three well-developed rays. Lower pectoral rays longest, as in *Leptoclinus*.

Type, *Plectobraichus evides* sp. nov.

#### 65. *Plectobranchnus evides* sp. nov.

Body very slender, the depth nearly constant throughout, about one-eleventh of the length. Caudal peduncle without free portion, its depth  $2\frac{1}{2}$  in that of body.

Head rather long,  $4\frac{3}{4}$  in length, extending well beyond origin of dorsal fin.

Upper jaw with a broad inner band of minute teeth in front and on the sides, the outer series enlarged, two in the front of the jaw distinctly canine-like. Teeth in the lower jaw similar to the outer series above, in a single series laterally, forming a patch in front of jaw, where two of them are much enlarged canines, the largest teeth in the jaws. Vomer and palatines with bands of small but very evident teeth.

Eyes large, close together, the interorbital space half pupil. Orbit  $3\frac{1}{5}$  in head, longer than snout. Posterior nostril with a short flap, the tube obsolete. Mouth large, somewhat oblique, maxillary reaching middle of orbit,  $2\frac{1}{5}$  in head. Top of head with very large pores, a series running backward from each eye, the two joined by a cross-series on occiput.

Body covered with very small cycloid scales, including belly, nape, breast, and cheeks, those on breast and cheeks not imbricated. Lateral line without visible pores.

Spinous dorsal beginning well forward, the distance from its origin to nape less than from latter to posterior margin of orbit. Anterior spines short, but fully united by membrane, the longest spine  $3\frac{1}{2}$  in head. Membrane of last spine reaching base of upper caudal rays. Origin of anal very slightly in advance of middle of body. Anal with two short, sharp spines, the rays longer, their terminal third free from membrane. Last anal ray connected with base of lower caudal ray.

Ventrals well developed, nearly half head. Pectorals with lowermost rays abruptly lengthened, two-thirds head. Caudal short, rounded, little more than half head.

D. LVI; A. II, 34.

*Color*: Dusky olive above, lighter below; sides crossed by about 25 narrow white bars, narrower than interspaces. Three equi-distant dark blotches near back, each double, the two halves occupying contiguous interspaces between white bars. Branchiostegal membrane black. Head without markings. Pectorals white at base, the distal half black, margined with white. Ventrals white. Dorsal with alternating oblique bars of white and blackish, two jet-black roundish spots on its posterior portion. Caudal whitish at base, then dusky, margined with white, its upper ray jet-black. Anal light at base, becoming black at edge of membrane, the free tips of rays white.

A single specimen, 4 inches long, from Station 3064, in 46 fathoms.

#### **Lucioblennius** gen. nov. (*Blenniidae*).

Body very elongate, wholly naked; gill membranes broadly united, free from isthmus; dorsal fin single, extending along the entire back, its anterior half spinous. Ventrals in front of pectorals, 1, 2. First two anal rays spinous. Last rays of dorsal and anal joined to caudal. Teeth conic, not movable, in jaws and on vomer and palatines.

Type, *Lucioblennius alepidotus* sp. nov.

#### 66. **Lucioblennius alepidotus** sp. nov.

Body much compressed, slender throughout, the head rather deeper and wider than body. Snout long, depressed, and rather wide; the anterior profile descending very gradually. Mouth nearly horizontal, the lower jaw protruding, the gape extending to much behind orbit, the entire physiognomy remarkably pike-like.

Snout one-fourth head; maxillary  $1\frac{3}{4}$ ; eye,  $4\frac{2}{3}$  to 5. Head 3 in length. Depth  $3\frac{1}{4}$  in head. D. XVIII, 32; A. II, 30. Length  $1\frac{1}{2}$  inches.

Teeth in a villiform band in upper jaw, the outer series slightly larger. In lower jaw in a single series laterally, widening into a patch anteriorly, the outer enlarged. A few teeth only on vomer; palatines with a long and rather broad patch similar to those in jaws.

Dorsal fin beginning on the nape in advance of middle of opercle; the fin is uniformly low, extending the whole length of back, the posterior ray joined by membrane with the caudal; the spines and rays are similar in appearance, flexible and simple, none of the soft rays branched. The spines are more slender, and show no joints, the articulations being present in small number on all the soft rays. The highest ray is less than diameter of orbit.

Anal and caudal rays similar to those of soft dorsal. Caudal short, rounded. Origin of anal midway between tip of snout and end of caudal fin, its first two rays spinous. Ventrals under opercular margin, of one spine and two well developed rays, nearly one-half as long as head. Pectorals narrow, of apparently unbranched rays, about half as long as head.

*Color*: Light olivaceous, with eleven vertical dark blotches on sides, most of which divide to form on middle of sides double vertical bars. Top and sides of head with dark cloudings, and with numerous black specks of varying size. Middle of sides and base of dorsal with numerous pearly dots nearly as large as pupil. Branchiostegal membrane black posteriorly. The lateral bars are extended to base of dorsal, the anterior ones usually forming conspicuous black blotches which extend well up on the fin. Other fins unmarked.

Two specimens from Station 3005, in 21 fathoms.

#### 67. *Lycodes porifer* sp. nov.

Body very slender, the depth 14 in length; head  $5\frac{2}{3}$ . Head much contracted opposite orbits, the snout expanded, as in *Lycodopsis pacificus*. Mouth moderate, the maxillary reaching vertical from front of pupil,  $3\frac{1}{2}$  in head; eye,  $5\frac{2}{3}$ ; snout,  $3\frac{2}{3}$ ; interorbital width, one-third eye.

Teeth in front of premaxillaries in two series, merging into one laterally, the outer series anteriorly somewhat enlarged. Teeth in front of mandible in a broad band, narrowing laterally to a single series, none of them enlarged. Vomer and palatines with single series.

Head with two series of large and very conspicuous elongate pores, one series on mandible and subopercle, the second parallel with it on level of snout.

Gill openings wide, extending forwards beyond preopercular margin, the width of isthmus less than one-fourth length of slit.

Distance from origin of dorsal to tip of snout,  $4\frac{1}{2}$  in length. Median dorsal rays simply forked near base, those posteriorly in both dorsal



and anal repeatedly subdividing. Distance of anal from snout,  $2\frac{7}{8}$  in length.

Pectorals rounded, the lower half of fin longer than the upper, the rays thickened. The fin contains fifteen or sixteen rays, its length less than half head. Ventrals longer and slenderer than usual, each apparently composed of two rays closely joined, their length three-fourths orbit. They are inserted unusually far forwards, being in advance of preopercular margin.

Scales very small, circular, partially imbedded, covering body and vertical fins. Head, antedorsal region, breast, and a strip connecting the two latter embracing base and axil of pectorals, naked.

*Color:* Dusky-brown, the fins, sides of head, and belly blackish. Lining of mouth and gill cavity, and peritoneum black.

A single specimen, 12 inches long, from Station 3009, in 857 fathoms.

68. *Lycodopsis crotalinus* sp. nov.

Body very slender, the depth 12 in length; head,  $5\frac{1}{3}$ .

With much the appearance of *Lycodes parillus*, the cheeks tumid, much projecting laterally, the greatest width of head more than half its length. Snout short and broad, much depressed, the head scarcely constricted opposite orbits. Eyes with little lateral range.

In the single type specimen, the upper jaw greatly overlaps the lower, the mandibular band of teeth shutting entirely within those on premaxillaries. Maxillary reaching to behind middle of pupil,  $2\frac{2}{5}$  in head; eye, 6; interorbital width, 14; snout, 4.

Teeth in upper jaw in a single series, two or three small teeth sometimes present anteriorly, giving traces of an inner series. In lower jaw the teeth are sparsely set in a broad band anteriorly, becoming suddenly contracted to a single series on middle of sides. None of the anterior mandibular teeth enlarged, two or three of posterior teeth on sides larger and hooked backwards. No teeth on vomer or palatines.

Nostril in a short tube. Gill slits wide, reaching to below pectorals, but not extending farther forwards below than above. Width of isthmus one-third length of slit.

A series of seven pores along mandible and preopercle; a second series of seven or eight extending from snout along sides of head above premaxillaries.

Dorsal inserted over middle of pectorals, its origin as far from occiput as is the latter from front of pupil. Distance of front of anal from snout equals one-third length of body. Ventrals short, less than length of pupil. Pectorals with posterior margin obliquely truncate, the upper rays longest, the lower growing regularly shorter, thickened at tips. The fin has fifteen or sixteen rays, the longest  $2\frac{2}{5}$  in head.

Scales small, imbedded, covering body and most of vertical fins. A few very small, scattered scales on nape, posterior part of occiput, and contiguous parts of cheeks and opercles. Lateral line single, indis-

tinct, running obliquely downwards to near base of anal, thence backwards, not reaching base of caudal fin.

*Color*: Dark-brown, black on opercles, sides of snout, fins, and lower parts generally. A broad light bar across head behind eyes, extending down on cheeks; some light mottling on mandible and gular membrane. Lower rays of pectorals margined with whitish. Lining of mouth, gill cavity, and peritoneum jet-black.

A single specimen, 13 inches long, from Station 2980, in 603 fathoms.

#### 69. *Lycodopsis crassilabris* sp. nov.

Body exceedingly slender, the depth 16 in length; head  $6\frac{3}{4}$ . Occiput flat, forming a right angle with the descending cheeks, the snout short and wide, the upper lip conspicuously thickened and fleshy on the sides. Maxillary reaching vertical from front of pupil, 3 in head; exposed portion of eye 6; snout 4; width of snout 3.

Upper jaw with a single series of rather large distant teeth; mandible with a broad patch of cardiform teeth anteriorly, which becomes abruptly constricted on middle of lateral portion of jaw, the inner series alone continued backwards towards angle. Palate smooth.

Head not conspicuously excavated with mucous canals; series of pores present on mandible and sides of head. Gill openings continued forwards to below pectorals, and about to vertical from middle of opercle; the width of the isthmus one-fourth the length of slit. Opercular flap with a wide membranous border, produced backwards and largely covering base of pectorals. Gill-rakers very little developed, about twelve movable rudiments on horizontal limb of arch.

Origin of dorsal in front of middle of pectorals, slightly farther from occiput than is the latter from front of eye. Distance from origin of anal to tip of snout  $3\frac{1}{3}$  in total length. Ventrals nearly as long as eye, inserted under middle of opercle. Pectorals with fourteen or fifteen rays, the upper portion of fin longest, the lower rays rapidly shortened, the longest rays half as long as head.

Scales small, circular, covering nape, breast, and under side of pectorals, but absent on head. Lateral line single, inconspicuous, running below middle of sides, the pores not developed on the scales.

*Color*: Light-brownish above, dark below; lower side of head, margins of snout, gill membranes, part of opercles, and margins of vertical fins jet black. Ventrals and posterior face of pectorals black; anterior face of pectorals light glaucous-blue, margined with black. Lining of mouth and gill cavity and peritoneum black.

A single specimen, 12 inches long, from Station 2839.

#### *Aprodon* gen. nov.

Differing from *Lycodes* only in dentition, the teeth being present in a single strong series on the palatines, but none on the vomer. The genus is thus intermediate between *Lycodes* and *Lycodopsis*.

Type, *Aprodon corteziana* sp. nov.

70. *Aprodon corteziana* sp. nov.

Depth 8 to 9 in length; head  $4\frac{1}{2}$ .

Head high and narrow, snout broader, but long and very convex. Mouth large, maxillary reaching vertical from middle of orbit,  $2\frac{1}{3}$  in head; eye  $4\frac{1}{5}$ ; snout 3; depth of head 2.

Teeth in premaxillaries strong, conical, in a single series; lower jaw with the teeth mainly in two series, an outer row of slightly enlarged teeth, and an inner row directed backwards, a wide interspace between the two series with occasional scattered teeth only; posteriorly on sides of mandible a single series of teeth similar to those in upper jaw. Vomer toothless. Palatines with a single series of strong conical teeth.

Head without conspicuous mucous pores. A strong ridge on middle of occiput anteriorly. Gill slit wide, continued forwards to vertical from preopercle, the width of isthmus five times in length of slit. Gill-rakers short, better developed than usual, fifteen on horizontal limb of outer arch. The vertical limb of arches joined to gill cover by a fold of the lining membrane of the latter, as in *Macrurus*. Pseudobranchiæ well developed.

Origin of dorsal but little behind base of pectorals; the hinder margin of occiput midway between dorsal and front or middle of eye. Distance from snout to origin of anal  $2\frac{2}{3}$  in total length. Ventrals inserted under front of opercles, their length about three-fifths of orbit. Pectorals very large, broadly rounded, the upper portion of fin longest, the lower rays rapidly shortened, the lowermost with broad, fleshy tips; rays twenty or twenty-one in number.

Scales of the usual type, those on abdomen so deeply embedded as to be almost invisible; head, anterior half of nape, breast, and base of pectorals naked; pectorals and ventrals not scaled, other fins partly covered. Lateral line little developed, running along middle of sides and tail.

*Color*: Light-brownish, lighter below; vertical fins broadly margined with black, becoming almost wholly black behind. Pectorals light at base, black distally, with a conspicuous white edge. Ventrals white. Lining of mouth white, of gill cavity dusky; peritoneum black.

Six specimens, the longest 15 inches, from Stations 2925 and 2948, in 339 and 266 fathoms.

***Lycodapus*** gen. nov. (*Lycodidae*).

Body naked. Ventrals wanting. Vertical fins united around the tail. Gill openings wide, continued forwards under the throat; the gill membranes anteriorly narrowly united, loosely joined to the isthmus by a fold of lax skin. Branchiostegals, six. No pseudobranchiæ. Gills, four; a wide slit behind inner arch. Gill-rakers developed. Teeth present in jaws and on vomer and palatines, none of them enlarged. Vent remote from the throat.

Type: *Lycodapus fierasfer* sp. nov.

71. *Lycodapus fierasfer* sp. nov.

Body compressed, elongate, tapering rather rapidly backwards, the tail not produced to a filament. Head flat above, the cheeks deep, vertical, the mouth very oblique, with the lower jaw slightly the longest and nearly entering the upper profile. Skull very thin and papery, translucent.

Jaws weak; gape of mouth wide, the maxillary reaching vertical from behind front of pupil, 2 to  $2\frac{1}{2}$  in head; eye  $4\frac{1}{2}$ ; snout  $3\frac{1}{3}$ . Teeth all small, in a very narrow band in jaws, in a single series on vomer and palatines. Interorbital width two-thirds of eye.

Snout broad, depressed, spatulate; its tip prominent, turned upwards, the upper profile thus longitudinally concave. An evident median ridge on snout and interorbital space. Gill slits continued forwards below to vertical from middle of eye, the membranes united for a distance equaling diameter of pupil. Gill-rakers short, less than diameter of pupil, strongly toothed, about ten on horizontal limb of arch. Head without conspicuous mucous pores or cavities.

Dorsal beginning well forwards, its distance from occiput slightly less than that from occiput to nostril. The dorsal and anal rays are slender, all articulated, branched only at tips. Caudal not distinct, the rays springing from end of tail not projecting beyond the others.

Origin of anal immediately behind vent, its distance from snout nearly equaling one-third total length. Ventrals narrow, varying in length, about  $2\frac{1}{2}$  in head. Body and fins invested in a rather lax transparent skin, without trace of scales.

D. 82; A. 70. Head  $5\frac{1}{2}$  in length; depth 10.

*Color*: Body translucent, dusted with black specks. Abdomen blackish. Lips, inside of mouth, lining of gill cavity, and peritoneum jet-black. Iris silvery.

Several specimens, the longest  $5\frac{1}{4}$  inches, from stations 2980, 3010, 3072, in 610 to 1,005 fathoms.

72. *Leptophidium pardale* sp. nov.

Light-olive, a series of eight black bars downwards from back, scarcely reaching lateral line, sometimes continuous with their fellows of the other side, and alternating with smaller black spots on dorsal outline; below the smaller spots a series of round spots nearly as large as eye along middle line of sides. Sides and lower parts of head and body dusted with rather coarse black specks. Dorsal light, the margin with ten elongate black blotches, usually longer than the interspaces. Caudal dusky at base, its distal half white. Anal wholly black. Peritoneum and lining of gill cavity white.

Head  $5\frac{1}{2}$  in length; depth  $8\frac{1}{2}$ ; L.  $7\frac{1}{3}$  inches.

Body very slender, with a short head and small mouth; maxillary scarcely reaching vertical from posterior border of orbit, its length  $2\frac{1}{6}$  in head. Outer teeth very little enlarged, not movable; teeth present

on jaws, vomer, and palatines. Eye  $3\frac{2}{3}$  in head; snout  $4\frac{2}{3}$ ; interorbital width two-thirds eye. Gill-rakers slender, the longest one-fourth eye, four developed. Tip of snout with a strong, concealed spine, as in *L. prorates*. Opercle ending in a short spine.

Nape midway between front of dorsal and front of pupil. Dorsal beginning over middle of pectorals, which are  $2\frac{1}{4}$  in head. Ventral filaments very short; the inner the longest,  $4\frac{2}{3}$  in head.

Scales very small, about two hundred in a longitudinal series extending forwards on top of head to middle of interorbital space. Cheeks and opercles scaly.

A single specimen, from Station 3014, in 29 fathoms.

#### 73. *Leptophidium microlepis* sp. nov.

Closely related to *L. prorates*, differing principally in the much smaller scales.

Head  $4\frac{2}{3}$  in length; depth  $7\frac{1}{2}$  to 8.

Rostral spine very strong as in *prorates*. Eye  $4\frac{1}{4}$  to 5 in head; snout 5; interorbital width  $6\frac{1}{2}$ ; maxillary extending beyond orbit,  $2\frac{1}{4}$  to  $2\frac{1}{2}$ .

Outer teeth enlarged, not at all movable, those in upper jaw largest. Four gill-rakers developed, the longest  $3\frac{1}{2}$  in eye. Opercle ending in a short concealed spinous point.

Dorsal inserted in front of middle of pectorals, the distance from nape to front of dorsal usually less than from nape to middle of eye. Longest ventral filament  $3\frac{3}{4}$  to  $3\frac{1}{2}$  in length of head. Pectorals  $2\frac{1}{4}$  to  $2\frac{1}{2}$  in head.

Scales exceedingly small, regularly imbricated, in about two hundred and fifty transverse series, thirty-five transverse series between nape and dorsal (about one hundred and seventy-five transverse rows in *prorates*, twenty-five series between nape and dorsal). Top of head scaly as far as front of eyes. Cheeks and opercles scaly.

Color as in *prorates*, the lining of peritoneum and gill cavity silvery white, the former with little or no black specking.

Many specimens, the longest 14 inches, from Stations 3015 and 3016, in 145 and 76 fathoms.

#### 74. *Leptophidium stigmatistium* sp. nov.

Much resembling *L. prorates*, differing in dentition, in gill-rakers, and in color.

A strong rostral spine. Head  $4\frac{1}{2}$  in length; depth  $9\frac{1}{4}$ . Eye  $4\frac{1}{3}$  in head; snout 6; interorbital width  $6\frac{1}{2}$ ; maxillary reaching slightly beyond posterior border of eyes  $2\frac{3}{4}$  in head. Outer teeth scarcely enlarged, evidently so only in front of upper jaw. Gill-rakers long and slender, strongly curved forwards at tip, the longest equaling one-half eye; seven well developed rakers present. Opercle ending in a rounded process, a broad soft flap projecting beyond it.

Dorsal inserted behind middle of pectorals, the nape equidistant from

front of dorsal and base of rostral spine. Pectorals  $2\frac{2}{3}$  in head. Longest ventral filament  $2\frac{3}{4}$  in head.

Scales small, about as in *prorates*, one hundred and eighty transverse series, twenty-eight in front of dorsal, continued forwards on top of head to front of pupil. Cheeks and opercles scaly.

*Color*: Dusky olivaceous, lighter below; dorsal with a large black blotch on anterior rays, the margin obscurely dusky; anal broadly margined with jet-black; caudal with median rays black at base, the outer rays and the margin light. Lining of gill cavity jet-black. Inside of mouth white. Peritoneum bright silvery.

A single specimen 10 inches long, from Station 2996, in 112 fathoms

75. *Leptophidium emmelas* sp. nov.

Body deep, compressed, its height  $5\frac{2}{3}$  to 6 in length; head  $3\frac{3}{4}$  to 4. Maxillary reaching slightly beyond orbit,  $2\frac{1}{3}$  to  $2\frac{1}{4}$  in head. Jaws slender and weak, the teeth in very narrow bands, the outer not enlarged. Eye as long as snout,  $4\frac{3}{4}$  in head; interorbital width 7. Rostral ridge very sharp, bearing a flat spine at its base directed upwards and backwards, terminating in a very slender sharp spine anteriorly.

Opercle ending in a weak spinous point behind. Gill rakers short and slender, the longest half pupil, eight or nine movable ones developed. Skull and all bones of head very thin and papery.

Dorsal beginning over base of pectorals, the nape midway between its origin and middle of orbit. Distance from snout to origin of anal  $1\frac{1}{3}$  in distance from latter to end of tail. Pectorals half length of head. Ventral filament  $2\frac{3}{4}$  in head.

Scales large, eight between lateral line and front of dorsal, covering cheeks, opercles and top of head forwards to middle of interorbital space. About one hundred and twenty-five transverse rows on sides, eighteen or twenty before dorsal. Vertebrae 13+41.

*Color*: Brownish, much dusted with minute specks; fins blackish, the vertical fins with an indistinct narrow whitish margin. Inside of mouth dusky; the roof of mouth, lining of gill cavity, and peritoneum jet-black. Many specimens, the longest 9 inches, from Stations 3007 and 3008, in 362 and 306 fathoms.

76. *Otophidium galeoides* sp. nov.

Closely related to *O. taylori* and *O. indefatigabile*, differing from both in color, from the former in gill-rakers, and from the latter in the much shorter head, smaller mouth, less imbricated scales, the more posterior insertion of dorsal, and the absence of spines on head.

Head  $5\frac{1}{2}$  in length, depth 6. Maxillary reaching beyond pupil,  $2\frac{1}{3}$  in head; snout  $4\frac{2}{3}$ ; eye  $3\frac{2}{5}$ . D. 125. Gill-rakers short and broad, four of them developed. Opercle ending in a sharp concealed spine. Outer teeth little enlarged.

Dorsal beginning over middle of pectorals, the nape equidistant be-

tween front of dorsal and tip of snout. Caudal very short and bluntly rounded, as in *O. taylori*, the rays not projecting beyond dorsal and anal. Pectorals  $1\frac{2}{3}$  in head. Ventral filament half head.

Scales as in *taylori*, not at all imbricated, arranged with their long axes frequently at right angles to each other. Head naked.

*Color*: Light olive, without bars, a narrow dusky streak along base of dorsal, and a round light spot at origin of dorsal. A series of small olive-brown spots along lateral line, with a few scattering spots below it but none above. Nape and head without spots. Vertical fins translucent. Dorsal with a large black blotch on tip of anterior rays, the fin behind this narrowly edged with black, which does not surround the caudal. Anal with much silvery-white pigment anteriorly on distal portion, becoming dusky behind. Pectorals translucent, edged with white below. Peritoneum, buccal, and gill cavities white.

One specimen,  $5\frac{1}{2}$  inches long, from Station 3025, in  $9\frac{1}{2}$  fathoms.

77. *Catætyx rubrirostris* sp. nov.

Closely related to *C. messieri*, differing in the shorter, broader snout, the wider preopercle, the more anterior origin of anal, and apparently in the gill-rakers and pores on head.

Depth of body below origin of dorsal equals one-third distance from end of snout to vent, 7 in length; head 4; distance from snout to origin of dorsal  $3\frac{1}{5}$ ; from snout to vent  $2\frac{2}{5}$ ; maxillary extending beyond eye,  $2\frac{2}{5}$  in head; eye equaling snout,  $5\frac{1}{2}$ ; interorbital width 7; width of snout  $3\frac{1}{5}$ .

Teeth in upper jaw in a narrow band, minute, compressed, narrowly triangular, none of them enlarged. In the lower jaw a still narrower band of similar teeth, the posterior row slightly enlarged, and increasing a little in size on sides of jaw, where it is accompanied by a single series only of the smaller teeth; this lateral series is continued backwards far beyond premaxillary band. Teeth on vomer and palatines similar to those in sides of lower jaw, the former in a V-shaped patch, the latter in a long and very narrow band.

Anterior nostril in a short tube at tip of snout, the posterior large, without tube, immediately in front of eye. System of mucous pores well developed but not conspicuous, the pores collapsing on account of the thinness of the skin covering head. The large mucous tube below eye extends around front of snout and opens by slit-like pores along edge of snout and lower margin of infraorbital flap; it opens posteriorly by a vertical slit half as long as pupil, immediately above end of maxillary. Another series of pores along mandible and at edge of expanded limb of preopercle. No other evident pores.

Angle of preopercle much expanded, its width equaling diameter of pupil. A sharp strong spine arising from anterior portion of opercle, the structure of the gill-flap apparently like that of *Neobythites stelliferoides*. A short sharp spine directed backwards immediately behind

posterior nostril. No other spines on head. Gill openings wide, continued forwards to below posterior margin of orbit, the membranes wholly free from the isthmus. Gill-rakers short but not very broad, about half length of pupil, only two or three developed immediately in front of angle of arch.

Dorsal beginning over or slightly behind middle of pectorals, the distance from its origin to occiput equaling or somewhat exceeding distance of latter from tip of snout. Dorsal and anal fully united to caudal. The caudal has a base of appreciable width, bearing about twelve close-set rays, which extend much beyond tips of last dorsal and anal rays. Origin of anal nearer snout than base of caudal.

Ventrals slender, each consisting of a single ray, inserted very near together, under anterior portion of opercle, their length about equaling that of maxillary. Pectorals with about twenty-three rays, evenly rounded behind, their length  $1\frac{2}{3}$  in head.

Scales very small, cycloid, regularly imbricated, in about one hundred and thirty-five transverse series. The nape and belly are scaled, as is also the head, excepting snout, mandible, suborbital, and sometimes interorbital areas.

*Color*: Dusky olive, the ventrals white, the other fins black, at least on distal portions. Opercles, gill membranes, sides and top of snout, and posterior portion of abdomen, blue black. The snout flushed with dark ruby-red in life. Living membrane of mouth and gill cavity, and peritoneum, jet-black.

Four specimens, the longest  $4\frac{1}{2}$  inches in length, from Stations 2909, 2925, and 2936, in 205 to 359 fathoms.

78. *Neobythites stelliferoides* sp. nov.

Head 4 to  $4\frac{1}{2}$  in length; depth, 5 to  $5\frac{1}{4}$ . D. 95, A. 82. Scales in about one hundred and ten transverse rows. Physiognomy strikingly like that of *Stelliferus*. Mouth large, oblique, the lower jaw included, maxillary reaching well beyond orbit, half length of head.

Teeth uniform, small, in narrow bands, those on vomer in a  $\cap$  shaped patch; a well-developed band on palatines; tongue smooth, a well-developed denticerous crest on median line behind it. No barbel at symphysis.

Snout short, bluntly rounded, about equaling diameter of orbit, slightly overhanging mouth, 5 in head; interorbital width, 4. Upper limb of preopercle extending obliquely downwards and backwards, largely adnate, the angle produced into a free membranous flap which entirely conceals the narrow interopercle, and bears no spines.

The structure of the gill-flap does not appear to have been correctly interpreted. The opercle is strong, but of small extent, forking at its base, one branch continued straight backwards as a strong spine, the second a narrow flat process downwards and somewhat backwards, parallel with and little distant from margin of preopercle. Filling the



deep notch between these two processes, and forming the greater portion of the gill-flap, is the thin membranous subopercle. Branchiostegal rays seven. Gill-rakers long and slender, the longest three-fourths diameter of orbit, seven above angle, thirteen and about five radiants below.

Nape midway between front of dorsal and front of eye. Dorsal and anal similar, uniform, low, joined to base of caudal; the latter truncate, projecting well beyond them. Ventrals inserted under angle of preopercle, each of a single ray forked to the very base, the two branches united by membrane for a distance equaling two-thirds orbit. The inner filaments are the longest, one-third longer than head, and extend well beyond front of anal. Pectorals long and narrow,  $1\frac{1}{2}$  in head; a narrow membranous flap connects base of pectorals with upper angle of opercular flap.

Scales small, well imbricated, entirely investing body and head, including gular membrane and part of gill membranes. Lateral line nearly complete, lacking for about one-seventh length of body, running high, parallel with dorsal outline.

*Color*: Silvery gray, dusted with coarse black specks, darker along dorsal outline. Dorsal and anal with a narrow light streak at base, otherwise dusky, becoming black posteriorly, and with a narrow white margin. Caudal black, with a broad white terminal bar. Pectorals and ventrals white, with few black specks. Peritoneum silvery white. Mouth white anteriorly; its posterior portion and gill cavity jet-black.

Many specimens from Station 2996, in 112 fathoms. Length 7 inches.

#### 79. *Physiculus rastrelliger* sp. nov.

Head  $3\frac{1}{2}$  in length; depth  $4\frac{3}{4}$ . Length of caudal peduncle to base of median caudal rays, three-sevenths head. Snout short and broadly rounded,  $4\frac{1}{4}$  in head; eye  $3\frac{2}{5}$ ; interorbital width  $4\frac{1}{3}$  to  $4\frac{2}{5}$ ; maxillary  $2\frac{1}{4}$ , extending to vertical from posterior margin of pupil.

Teeth in rather broad bands, none of them enlarged; width of patch on premaxillaries half pupil; vomer and palatines toothless. Branchiostegal membranes broadly united, joined to the isthmus anteriorly, the width of the free fold more than half pupil. Gill-rakers numerous, slender, moderately long, the longest one-third diameter of orbit, about seven above angle, seventeen to nineteen below, the anterior ones short but movable.

Origin of first dorsal slightly in advance of base of pectorals, its distance from tip of snout  $3\frac{2}{7}$  in length. Base of first dorsal equaling length of snout, its longest ray  $2\frac{2}{5}$  in head. Free portion of caudal peduncle equals diameter of eye.

Second dorsal notched, the median rays three-quarters the height of the highest anterior rays, the posterior highest, equaling first dorsal and longest caudal rays. Anal similar to soft dorsal, but lower. Ventrals under middle of opercle, the distance between their bases little

less than interorbital width, equaling distance from vent to anal fin. Ventrals with seven rays, the outer two produced, the second the longest, reaching base of seventh or eighth anal ray. Pectorals with broad base, covered with lax membrane, containing twenty-six to twenty-eight rays, their length  $1\frac{1}{2}$  to  $1\frac{2}{3}$  in head.

D. 8 or 9—53 to 61; A. 57. Lat. l. 100 to 110.

Scales small, comparatively little reduced on top of head, a broad ring encircling snout in front of eyes naked, a very narrow patch of scales between this laterally and premaxillaries. Scales in one hundred to one hundred and ten transverse rows, eight or nine between lateral line and front of dorsal. Lateral line wanting on posterior part of body, in the latter part of its course present on occasional scales only.

*Color*: Uniform grayish-olive on sides, each scale, or at least its marginal half, closely covered with minute dark specks. Gular and branchiostegal membranes, ventral region, and axil of pectorals blue-black. Basal portion of vertical fins light bluish, margined with blackish. Pectorals dusky; ventrals blue-black at base, the distal portion white. Lining membrane of mouth and gill cavity white; peritoneum silvery, but in places so filled with black specks as to appear black.

Many specimens, the longest 8 inches, from Stations 3045 and 2987, in 184 and 171 fathoms.

#### 80. *Physiculus nematopus* sp. nov.

Head 4 in length; depth 5. Length of caudal peduncle to base of median caudal rays  $5\frac{1}{4}$  in head. Snout very broadly rounded, its width twice its length, which is  $4\frac{2}{3}$  in head; eye  $3\frac{3}{4}$ ; interorbital 4; maxillary 2, reaching slightly beyond vertical from posterior margin of orbit.

None of the teeth enlarged; palate smooth. Branchiostegal membranes more narrowly joined than in *rastrelliger*, but wholly free from isthmus. Gill-rakers short and slender, eleven movable ones on horizontal limb of arch.

Origin of first dorsal over base of pectorals, its distance from tip of snout  $3\frac{2}{3}$  in length. Base of first dorsal equaling snout and half eye, its highest ray  $2\frac{1}{4}$  in head. Free portion of caudal peduncle one-third diameter of orbit. Notch of dorsal and anal fins not conspicuous, the posterior dorsal rays little longer than those which precede,  $2\frac{1}{2}$  in head; caudal  $2\frac{1}{3}$ ; pectorals  $1\frac{1}{2}$ . Ventrals with broad base and seven rays, the outer two filamentous, the second the longest, reaching base of tenth to twelfth anal rays, and as long as head. Distance between bases of ventrals equals interorbital width.

D. 7 to 9—56 to 61; A. 59 to 64. Lat. l. 90 to 105.

Scales small, regularly imbricated, becoming minute on snout, which they completely invest as well as mandible and gular membranes. Lateral line present on anterior half of body only; eight scales above it anteriorly.

*Color*: Light olive-brown sprinkled with dark specks, the sides of

head and trunk with silvery luster. Snout, mandible, and gular membrane dusky; abdominal area, branchiostegal membranes, base of ventrals, axillary blotch, and front of anal purplish-black. Posterior edge of gill membranes and opercular flap white. Dorsals dusky, with an inconspicuous darker margin, which becomes more marked posteriorly. Anal darker, margined with black. Caudal blackish. Pectorals and filamentous portion of ventrals white. Inside of mouth and gill cavity white. Peritoneum silvery, rendered black on sides by clusters of spots.

Many specimens, the largest 7 inches long, from Stations 2997, 3011, 3015 and 3016, in 71 to 221 fathoms.

81. *Macrurus* (*Cœlorhynchus*) *scaphopsis* sp. nov.

Depth  $6\frac{3}{4}$  in total length; head  $4\frac{1}{6}$ . Lat. l. ca. 98. D. II, 8; A. ca. 95. Snout flattened, acute, the conspicuous infraorbital ridge forming a strong ridge along its sides, the two meeting at tip in a salient point. An evident keel extends from tip of snout to middle of interorbital area. The supraorbital ridge divides anteriorly, one branch running down in front of nostril, the other separating nostril fossa from orbit. Between the ridges the head is covered with a soft, yielding integument, which is semi-translucent.

Lower side of snout wholly naked below, and with a large naked area above on each side of tip. The snout projects beyond the mouth for a distance equaling length of maxillary.

Mouth of moderate size, the maxillary reaching vertical from posterior margin of pupil,  $3\frac{1}{3}$  in head. Teeth villiform, in a broad band in upper jaw, in a narrower band below, not reduced to a single series laterally in either jaw, and none of the teeth enlarged.

Eyes large, elliptical, equaling length of snout,  $3\frac{1}{4}$  in head; interorbital width  $4\frac{1}{3}$ . Barbel short, about half pupil. Preopercular angle greatly produced backwards, wholly concealing the interopercle, the strong infraorbital ridge failing to reach preopercular margin by only one-third diameter of pupil. Structure of gills as usual in this genus, the gill-rakers obsolete. Gill membranes broadly united, joined to isthmus, across which they form posteriorly a very narrow free fold.

Besides the ridges already described on head, there are a pair on occiput, a pair from upper posterior margin of orbit to upper angle of gill opening, and a median ridge on nape reaching about half way from occiput to dorsal. These ridges, as well as the interorbital space and the area between the occipital ridges, are covered with scales compressed to a knife-like edge, which is provided with a single series of backward-directed spines. The scales on infraorbital and rostral ridges bear stellate spines or are similar to those on temporal region, sides of head, and body generally.

Scales on body large; three longitudinal series between lateral line and middle of first dorsal. Each scale is provided with a ridge bear-

ing about six backward-directed spines, and from two to four pairs of lateral ridges also bearing spines, the lateral ridges sometimes extending the whole width of scales, sometimes confined to their basal portion; marginal spines longest. Axil of pectorals naked, its base anteriorly with small cycloid scales.

A naked, much depressed, elliptical area between bases of ventrals in all specimens.

Second dorsal spine smooth, weak, little exceeding length of soft rays, equaling length of snout and orbit. Base of first dorsal  $1\frac{1}{2}$  in interspace between dorsals, which is  $2\frac{2}{3}$  in head. Distance from front of anal to snout equals one-third total length. Ventrals with the outer ray produced, about reaching front of anal. Pectorals reaching beyond anal, half length of head. Ventrals with seven rays. Pectorals with fifteen to seventeen rays.

*Color*: Light olive-brown, dusted with coarse black specks; axil of pectorals, belly, ventrals, and branchiostegal membranes blue-black; lower side of head dusky. Mouth anteriorly, including tongue and half of palate, white; its posterior part and most of lining of gill cavity jet-black; inner lining of cheeks abruptly white. Lower part of iris silvery. Peritoneum silvery, with coarse dusky specks. Vertical fins dusky, the anterior portion of anal black.

Many specimens, the longest 12 inches long, from Station 3015, in 145 fathoms.

#### 82. *Macrurus* (*Macrurus*) *stelgidolepis* sp. nov.

Head  $4\frac{2}{3}$  in length; depth  $5\frac{1}{2}$ . D. II, 10 or 11; A. 130. Lat. l. ca. 155; five or six scales between lateral line and base of first dorsal.

Body deep, the lower profile rapidly rising along anterior portion of base of anal, the tail thus abruptly becoming slender. Head short and deep; snout heavy, little produced, acute at extreme tip; infraorbital ridge not prominent on sides of head or snout, not continued backwards on preopercle. A pair of narrow transverse naked strips on upper surface of snout near tip, separated on each side by a single scale from the naked nostril fossa. A double series of scales intervenes between the nostrils and the orbit. Lower side of snout wholly naked anteriorly, partly scaled laterally.

Mouth large, overhung by premaxillaries for a distance about one half diameter of orbit. Premaxillaries in advance of nostrils; maxillaries reaching vertical from posterior margin of pupil,  $2\frac{2}{3}$  in head; snout about equaling interorbital width,  $4\frac{1}{2}$ ; eye small,  $3\frac{1}{2}$  to 4. Barbel long, five-sixths orbit.

Teeth in cardiform bands of equal width in both jaws, narrowed laterally, but not to a single series. Anterior series in upper jaw enlarged, in lower jaw all the teeth of equal size.

Preopercle broadly rounded, the angle but moderately produced, a narrow strip of the interopercle visible for its entire length. Outer

gill arch partially joined to gill cover, as usual. Gill-rakers obsolete. Gill membranes united, forming a wide free fold across isthmus posteriorly.

Scales without ridges, their exposed surfaces thickly beset with spines, which are usually without definite arrangement. The marginal spines are the longest, thence decreasing in length to the base; about forty present on each scale on middle of sides. The scales on head are crowded, the spines are shorter and not directed backwards as on the body. A rosette of short spines on tip of snout. No naked area between ventrals. Mandible and gill membranes partly scaled. No considerable naked area in axil of pectorals.

Dorsal inserted over base of pectorals, the length of its base slightly less than half the interspace between base of dorsals. Second dorsal spine rather short and fragile, furnished anteriorly with a series of retrorse spinules. Its length slightly exceeds half that of head, its tip not reaching origin of second dorsal.

Origin of anal fin well in advance of second dorsal; the vent is unusually far forwards, its distance from base of ventrals two to two and one-half times in its distance from anal fin.

Ventrals less widely separated than in *M. scaphopsis*, the outer ray produced, extending beyond front of anal. Ventrals with ten rays. Pectorals with twenty-two to twenty-four rays. Longest pectoral ray equals half head.

*Color*: Very dark brownish, lighter on tail; lower side of head, breast, and abdominal region, including front of anal and base of pectorals, blue-black. Roof of mouth, valvular flap of membrane behind bands of teeth, gill membranes, and upper posterior portion of opercular lining, black; mouth and gill cavity otherwise white. Peritoneum bright silvery, with little black specking. Fins dusky.

Two specimens, the longest 12 inches in length, from Station 2960, in 267 fathoms.

83. *Macrurus* (*Lionurus*) *liolepis* sp. nov.

Head  $4\frac{2}{3}$  in length; depth  $6\frac{1}{2}$ . D. II, 10; A. 120. L. 10 inches.

Snout short and high, with well marked lateral ridge, the extreme tip flattened; the median ethmoidal ridge is prominent, and the supra-ocular ridge is continued forwards on the snout, meeting the lateral ridge in a projecting point. Top of snout wholly naked mesially, a narrow band of scales around each margin and in front. Lower side of head including under side of snout, mandibles, gill membranes, and most of interopercles naked; a very small patch of scales on posterior part of interopercle.

Mouth moderate, the snout overhanging the premaxillaries for a distance equaling one-half maxillary. Maxillary nearly reaching vertical from posterior margin of orbit,  $2\frac{1}{2}$  in head; eye  $3\frac{3}{4}$ ; interorbital space concave, equaling snout,  $4\frac{1}{3}$ . Barbel three-fifths eye.

Teeth in rather narrow cardiform bands in both jaws, not however forming single series laterally; the outer series in upper jaw only is enlarged. Angle of preopercle little produced, not concealing the interopercle; the infraorbital ridge not continued on to it. Gill membranes forming posteriorly a rather wide free fold across isthmus. Outer gill arch joined to gill cover as usual in this genus.

Scales small, everywhere cycloid, very deciduous, lost in most specimens. No spines are developed, but occasionally can be seen traces of a median ridge and a pair of lateral ridges. About six or seven series of scales between lateral line and base of first dorsal.

Origin of first dorsal over or in advance of the base of the pectorals. Base of first dorsal  $1\frac{1}{2}$  to  $1\frac{2}{3}$  in interval between dorsals. Second dorsal spine usually smooth, occasionally with from one to three weak prickles near the middle. Length of spine  $1\frac{2}{5}$  in head.

Origin of anal slightly behind first dorsal, the vent midway between base of ventrals and anal. Ventrals short, the outer ray slightly produced, with from ten to twelve rays. Pectorals with twenty or twenty-one rays.

*Color*: Very dark brown; snout, opercles, lower side of head, and abdominal region, black or blue-black. Mouth and gill cavity black; peritoneum dusky silvery.

Station 2980, in 603 fathoms. Many specimens.

#### 84. *Platophrys tæniopterus* sp. nov.

Differing from all known species in the ribbon-shaped prolongations of second dorsal ray and first and second ventral rays of eyed side, and in the obsolete lateral line of blind side.

Body elongate, the depth  $2\frac{1}{2}$  in length, in specimens  $3\frac{1}{2}$  inches long. Caudal fin subsessile, the last dorsal and anal rays inserted near rudimentary caudal rays; height of caudal peduncle one-quarter height of body. Upper profile descending very obliquely anteriorly, a slight re-entrant angle in front of lower eye; in males, the profile slightly angulated in front of upper orbit, below which it descends more steeply.

Lower eye much in advance of upper; in females, with eyes close together, the vertical from middle of lower eye passes through front of upper orbit. Diameter of upper orbit  $3\frac{1}{2}$  in head. In males the lower eye may be entirely in advance of upper.

In females 3 inches long, and in very young males the interorbital space is a narrow, concave, scaleless groove, less than diameter of pupil, running into a deep pit behind lower eye. In males 2 inches long, the interorbital space has already widened, and in specimens  $3\frac{1}{2}$  inches long is as wide as longitudinal diameter of orbit. It is traversed by an oblique ridge running upwards and backwards from front of lower eye, separating the anterior scaleless portion from the deep scaly pit behind. Supraorbital ridge of lower eye serrated, forming a strong

series of spines, less marked in females. Anterior rim of upper orbit similarly, but less strongly, marked. A strong double spine on maxillary, in front of nostrils. A spine near end of maxillary in males.

Mouth small, maxillary not reaching front of pupil, equaling diameter of orbit. Teeth small, in a single close-set series in each jaw, equally developed on both sides, with enlarged canines.

Gill-rakers very short and weak, eight on horizontal limb.

Anterior nostrils with very short flaps.

Dorsal beginning above front of lower eye. In all specimens, females as well as males, the first two rays are detached from the rest of fin, the second ray produced into a flat ribbon-shaped filament about as long as head. Dorsal and anal rays all unbranched. Median caudal rays forked. No anal spine.

Ventral of colored side on ridge of abdomen, the two anterior rays in males connected by membrane at base only, produced into flat filaments as long as head, extending far beyond front of anal.

Pectoral of left side well developed, but small, slightly more than half head; that of blind side little developed, about half diameter of orbit.

Scales of left side strongly ctenoid, absent on interorbital space, snout, maxillary and mandible; lateral line with strong curve anteriorly, the chord of which is contained five times in straight portion. Along lateral line are occasional broad cutaneous flaps, colored blue in life. Scales of blind side cycloid, the tubes of lateral line obsolete, the course of lateral line indistinctly indicated by pits at bases of scales, and occasional pore-like markings. Median rays of dorsal and anal on left side with series of ctenoid scales, otherwise scaleless. Caudal rays with double series on both sides.

Head  $3\frac{2}{3}$ ; depth  $2\frac{1}{2}$ . Lat. l. 60-65, the arch with fifteen pores. D. 86-88; A. 67-70. Twenty scales in a series running upwards and backwards from lateral line. L.  $3\frac{1}{2}$  inches in longest specimen.

*Color:* On left side olive-brown, with many small irregular spots of light gray, with darker borders. Three or four dark blotches along lateral line. Along dorsal and ventral outlines are about five pairs of light spots, broadly ocellated with blackish. Males with a bright blue spot on anterior profile, at base of each of first ten or twelve dorsal rays, and one on end of snout.

Blind side in males with a broad oblique bar covering about one-fourth of sides, bluish-black in life, dark brown in spirits. From its upper anterior part a number of narrow parallel streaks run forwards towards head, much as in *Engyophrys sancti-laurentii*. Filamentous rays of dorsal and ventral white. Fins all speckled; a small black spot at base of median caudal rays.

Several specimens from Station 2998, in 40 fathoms.

85. *Citharichthys xanthostigma* sp. nov.

D. 81-86; A. 63-67. Lat. l. 50. Vertebrae, 11+26.

In external appearance most closely resembling *C. sordidus*, to which, however, it is not closely related, differing in number of scales, fin rays, and vertebrae, and in the size and number of gill-rakers.

Body deep, varying from  $2\frac{1}{2}$  (in young, 3 inches long) to  $2\frac{1}{10}$  (7 inches long) in length of body. Profile angulated above front of upper eye, the snout convexly projecting. Depth of caudal peduncle one-third head. Lower eye in advance, the vertical from front of the upper passing through front of lower pupil.

Mouth rather small, the outline somewhat curved, the maxillary reaching the vertical from front of lower pupil, 3 to  $3\frac{1}{4}$  in head; mandible with a sharp downward-directed point at symphysis. Teeth in a single close-set series in each jaw, growing slightly larger anteriorly, but without canines. Anterior nostril with a short tube, and a narrow flap arising from its inner edge. Interorbital width  $3\frac{3}{4}$  to 5 in orbit, slightly concave, the lower ridge much stronger and higher than the upper; scaled posteriorly. Eye large, the upper orbit  $3\frac{1}{2}$  to  $3\frac{2}{3}$  in head. Gill-rakers rather long and slender, coarsely dentate on inner margin, distant, ten or eleven on anterior limb of arch.

Scales large, in regular series, appearing cycloid, but the edges very minutely spinous. Lateral line gently rising on anterior third, but without curve. Fifty vertical series of scales, with as many pores in lateral line; 13 to 15 horizontal series above lateral line.

Dorsal beginning immediately behind posterior nostril of blind side, ending so as to leave caudal peduncle free for a distance equaling one-half diameter of eye.

Ventrals long, reaching beyond origin of anal.

Pectorals very long and slender, normally with nine rays, the longest ray on colored side longer than head, about one-third length of body.

*Color*: Light olive-brown, irregularly flecked with slaty, and with numerous bright yellow spots broadly ocellated with brownish-black: a series of these usually on lateral line, and two others half-way between it and the dorsal and ventral outlines respectively, those of the latter series forming pairs. Fins not conspicuously marked, the pectorals sometimes with faint broad dusky cross-bars.

Many specimens, from Stations 3039, 3043, and 3044, Magdalena Bay, in 47 to 74 fathoms.

86. *Citharichthys fragilis* sp. nov.

D. 83-87; A. 67-70. Lat. l. 46-50. Vertebrae 10 + 27.

Closely related to *C. sordidus*, from which it differs in the fewer vertebrae and fin rays and the larger scales. The body is elongate, posteriorly sharply wedge-shaped, tapering to base of caudal. Anterior profile very conspicuously angulated above front of upper eye, the snout



strongly projecting, its anterior profile nearly vertical. Depth,  $2\frac{3}{8}$  to  $2\frac{3}{4}$  in length in specimens 5 inches long. Depth of caudal peduncle,  $2\frac{7}{8}$  in head.

Head,  $3\frac{2}{5}$  to  $3\frac{3}{5}$  in length. Anterior nostril with a short tube and flap, the latter nearly obsolete on blind side. Mouth more oblique than in *sordidus*; maxillary reaching vertical from front of pupil,  $2\frac{2}{5}$  to  $2\frac{3}{5}$  in head. Teeth in a single series, close-set, those anteriorly somewhat enlarged, but none of them canine-like. Eyes large, the vertical from front margin of upper eye falling through front of lower pupil. Longest diameter of upper orbit  $2\frac{2}{3}$  in head. Interorbital space narrow, concave, scaled, the lower ridge strongest, its width about one-eighth diameter of orbit. Symphyseal knob sharp. Gill-rakers long, slender, close-set (as in *sordidus*), eighteen on anterior limb of arch, the longest one-third orbit.

Scales large, deciduous, somewhat irregularly arranged, twelve or thirteen series above lateral line. Scales smooth on blind side, minutely spinous on eyed side. Lateral line without anterior arch.

Dorsal beginning slightly in advance of eye, the longest ray half head.

Pectorals long and narrow, with eleven rays on colored side.

Color, dusky-olivaceous, with occasional slaty-blue spots.

Many specimens from the Gulf of California, in from 18 to 76 fathoms. Stations 3011, 3016, 3017, 3018, and 3033.

#### 87. *Ancylopsetta dendritica* sp. nov.

Differing from *A. quadrocellata* in the branched tubes of the lateral line, the very broad short gill-rakers rough with teeth, etc.

Body very broad, its depth  $1\frac{3}{8}$  in length, the two outlines equally curved; profile not very strongly angulated in front of upper eye. Lower eye slightly in advance of upper. Interorbital space a rather broad convex scaly ridge, about one-third upper eye, which is contained about five times in head and is equal to snout. A blunt spine on snout on head of maxillary. Nostril openings very broad, without tube, the anterior with a narrow flap. Mouth moderate, very oblique, the gape curved, maxillary reaching slightly beyond vertical from middle of lower eye, 3 in head. Teeth in a single rather close-set series in each jaw, strong, conical, directed very obliquely inward, becoming gradually larger towards front of jaw, but not canine-like. Gill-rakers very short, barely movable, as broad as long, strongly toothed, six on anterior limb.

Dorsal beginning over middle of upper eye, the anterior rays partly free toward tips, but little, if any, elevated above those that follow, the first  $3\frac{2}{3}$  in head. Dorsal highest in its posterior third, the longest ray  $2\frac{2}{5}$  in head. Anal similar, the rays of posterior third of both fins slightly forked at tips. Caudal peduncle deep and short, its depth about half head, its length half its depth. Caudal rounded, almost double truncate.

Ventrals with narrow bases, the left one slightly in advance of the right; the fin greatly produced, reaching far beyond front of anal, a trifle shorter than head. Left pectoral  $1\frac{3}{8}$  in head.

Scales very strongly ctenoid, the edge spinous, the entire exposed portion rough. Width of anterior arch of lateral line  $3\frac{1}{2}$  in straight portion. Tubes of lateral line borne by a series of smaller concealed cycloid scales, the free edges of which are notched to the opening of the pore. These scales are entirely covered by the integument, and from the pores there proceed backward membranous tubes, ramifying over the bases of contiguous scales. This is true also of lateral line of blind side. Eyed side entirely scaled except snout and mandible.

Head  $3\frac{5}{8}$  in length; depth  $1\frac{2}{3}$ . D. 84; A. 63. Lat. l. 100; 36 scales in a series upward and backward from lat. l.

Vertical fins covered with thick skin, each ray accompanied with one or two series of ctenoid scales. Left ventral also scaled.

Color, olive-brown, with three large black ocellated spots larger than orbit, the posterior one on lateral line in front of caudal peduncle, the two anterior under middle of dorsal, half-way between lateral line and dorsal and anal outlines, respectively; each spot with a light center. Distal portion of vertical fins more or less brown on right side.

A single specimen, 13 inches long, from station 3022, in 11 fathoms.

#### 88. *Hippoglossina bollmani* sp. nov.

*Hippoglossina macrops* Jordan and Bollman, Proc. U. S. Nat. Mus., 1889, 175 (not of Steindachner\*). Station 2805.

Differing from *H. stomata* Eigenmann in the gill-rakers, which are shorter and much fewer in number, and in the larger scales on sides.

Scales in sixteen rows between lateral line and back, instead of twenty-one or twenty-two as in *stomata*.

Gill rakers somewhat shorter, eight or nine on anterior limb, two on upper limb. In *H. macrops* the gill-rakers are slender, close-set, thirteen or fourteen on anterior limb, four on vertical limb.

In other respects of color, fin-rays, and squamation agreeing perfectly with *H. stomata*.

#### *Lioglossina* gen. nov. (*Pleuronectidae*).

This genus differs from *Hippoglossina* in the cycloid scales only, and from *Xystreurus* in the uniform fine teeth.

Type, *Lioglossina tetrophthalmus* sp. nov.

#### 89. *Lioglossina tetrophthalmus* sp. nov.

Body of moderate height, the profile distinctly angulated above upper pupil, the snout projecting; length of caudal peduncle one-half its depth, its outlines diverging backwards. Depth of body  $2\frac{1}{3}$  in

\**Hippoglossina macrops* Steindachner is nearer *H. stomata* than *H. bollmani*, but apparently differs in the deeper body and smaller mouth. Its gill-rakers are not described.

length. Head large,  $3\frac{1}{4}$  in length, in a specimen 1 foot long. Snout projecting beyond profile, bluntly rounded, the lower jaw included.

Mouth large, the maxillary reaching nearly to vertical from posterior border of lower eye,  $2\frac{1}{5}$  in head. A blunt projecting process anteriorly from head of maxillary. Teeth small, pointed, in a single close-set series in each jaw, none of them enlarged. Vomer toothless. Lower eye slightly in advance of upper; vertical from front of upper, falling midway between front of orbit and front of pupil of lower eye. Vertical diameter of upper orbit but little more than one-half its longitudinal diameter, which is contained  $3\frac{1}{2}$  in head. Interorbital space a blunt high ridge, entirely scaleless, its width two-fifths diameter of orbit. Anterior nostril of blind side with a very long flap, that of eyed side shorter. A well-marked cutaneous flap on lower eye above pupil.

Gill rakers very large, broad, and strong, well toothed on inner edges; the longest equals diameter of pupil; number on outer gill arch ten or eleven.

First dorsal ray over anterior margin of upper pupil, the fin not high, its highest ray 3 in head. Anal similar. Caudal sharply double truncate, the median rays produced. Ventrals rounded, equal, barely reaching front of anal. No spine before anal fin. Pectorals moderate, with nine or ten developed rays, half length of head. V. 6.

Scales rather small, growing distinctly larger posteriorly, everywhere smooth. Head scaled, except snout, interorbital area, mandible, and part of maxillary; the latter with a patch of scales on the posterior end of its expanded portion. On blind side an area around nostrils, and the greater part of the exposed portion of preorbital, scaleless. Fin rays of vertical fins, all with bands of fine scales, those on caudal especially broad. Lateral line with a broad arch in front, the chord of which is  $3\frac{2}{5}$  in straight portion.

D. 76 to 83; A. 58 to 62. Lat. l. (pores) 97. L. 12 inches.

*Color*: Dusky-brownish, with two conspicuous pairs of round black spots narrowly edged with gray, the anterior pair about half size of orbit, the posterior larger than pupil; the anterior pair are under beginning of posterior third of dorsal, and are about half way between lateral line and dorsal and anal margins, respectively; the posterior pair are nearer outlines of body, and are about under the tenth before the last dorsal ray. Vertical fins obscurely blotched with darker. Ventral of eyed side with a conspicuous black blotch margined with white, occupying the distal portion of its inner two rays. Pectoral unmarked. Membrane of gill cavity and peritoneum white.

Two specimens, about 12 inches long, from the Gulf of California, taken in 29 and 76 fathoms. Stations 3014 and 3016.

#### 90. *Cynicoglossus bathybius* sp. nov.

A well marked species differing from its congeners in its much greater depth and bright coloration, and in having the teeth well developed on both sides of jaws, as in the species of *Glyptocephalus*.

D. 111-117; A. 96-98. Vertebrae 14+49.

Body oval, very deep and thin, the greatest depth at anterior third of body; upper profile very abruptly angulated opposite hinder margin of upper pupil, the anterior half of head conspicuously protruding beyond general outline. Caudal nearly sessile, the peduncle very short.

Mouth small, maxillary about one-fifth length of head in specimens 1 foot long. Teeth broad incisors, slightly notched at tip, nearly equally developed on blind and colored sides, twenty-one on blind side of lower jaw, sixteen on colored side. As in other members of this group, the lower jaw is the longer, the upper teeth included,

Interorbital space wholly sealed, with a very high, rather sharp  $\sim$ -shaped ridge.

Eyes very large, the upper entering largely the upper profile, the lower much in advance; front margin of upper orbit on vertical of front of lower pupil; diameter of upper eye  $2\frac{3}{4}$  to  $2\frac{4}{5}$  in head.

Anterior nostrils of both sides in rather long tubes, the posterior margins of which are produced to form short flaps.

Preopercular margins adnate as usual, concealed by scales. No conspicuous mucous excavations on blind side.

Gill rakers weak and rather short, ten or eleven on anterior limb of arch.

Scales very small, cycloid, in about one hundred and sixty-five cross-rows, the tubes of lateral line much fewer, not regularly arranged. Over fifty longitudinal rows above lateral line.

Dorsal beginning over posterior edge of pupil. Fins low, the highest dorsal rays behind middle of body, two-fifths length of head.

Caudal rounded, two-thirds length of head. Pectorals one-half head.

Ventrals small, each with five rays, as in *C. pacificus*, the number being probably characteristic for the genus. *Glyptocephalus cynoglossus* and *zachirus* have six rays in each ventral.

Head 4 to  $4\frac{2}{5}$  in length; depth 2 to  $2\frac{1}{3}$ .

Color of eyed side warm brown, darker toward margins, becoming black on vertical fins; everywhere on body and fins coarsely blotched with light blue, the marks so arranged on upper and lower thirds of sides as to form five broad bars of bluish, alternating with those of the ground color, and corresponding above and below. Lips and branchiostegal membranes black. Blind side dusky brownish.

Two specimens from the Santa Barbara Channel, taken at a depth of 603 fathoms. Station 2980.

#### 91. *Halieutæa spongiosa* sp. nov.

This species is remarkable for the soft, spongy texture of the body, and the membranous or cartilaginous character of its bones.

Width of head  $1\frac{1}{2}$  in its length. Tail long and slender, the vent midway between base of caudal and articulation of mandible. Width of base of tail  $4\frac{1}{3}$  in its length. Mouth little or not at all overpassed

by the snout, its width  $2\frac{3}{4}$  to 3 in that of head, lower jaw usually not included; gape of mouth oblique, almost wholly anterior. Teeth in wide cardiform bands in the jaws, none of them enlarged. Palate toothless. Interorbital width slightly greater than length of snout, 5 in width of head. Eye  $1\frac{3}{4}$  in interorbital width.

Rostral tentacle short, with an expanded three-lobed tip. Front of dorsal midway between base of caudal and occiput. Caudal long, rounded, the lower rays more shortened than the upper, the longest nearly half width of head. Anal rays high, closely bound together, the fin slender, shaped like the intromittent organ of *Gambusia*; the length of its base equals two-thirds diameter of orbit; its longest ray reaches base of caudal. Pectorals long, the posterior ray rapidly shortened, the longest one-half width of head.

Head and body everywhere with broadly conical, tubercular plates, varying in size, marked with strong lines, radiating from the center. The apex is sometimes blunt, more often provided with a slender spine, sometimes bifid or trifid; on the tail these spines become longer and are directed backwards. The plates along edge of disk are not compressed nor specially modified.

A deep groove-like channel just behind mandible and following curve of latter, becoming continuous with another deeper channel running just below edge of disk to near base of pectorals. A third groove runs backwards from nostrils, uniting with the others. These grooves are spanned at intervals by pairs of fleshy tentacles with fringed tips, which spring from the edges of the grooves and meet across them. At the bottom of the grooves under each pair of tentacles is a small fleshy tubercle. Fin rays, at least at base, with series of small curved prickles. D. 6; A. 4; C. 9; V. 4; P. 12 or 13.

*Color*: Uniform dusky, the tail sometimes lighter; fins blackish, more or less edged with white. One specimen with the body and tail uniformly light.

Numerous specimens, the largest  $4\frac{1}{2}$  inches long from Station 2992, in 460 fathoms.

92. *Melichthys bispinosus* sp. nov.

Agreeing perfectly with current descriptions of *M. piceus* and *M. ringens*, but having only two dorsal spines in all of our numerous specimens.

Lower jaw but little protruding in open mouth. Eight teeth in each jaw, the two anterior of which are broad truncate incisors without notch. The three lateral teeth in lower jaw are conspicuously notched, the anterior angle projecting; in the upper jaw the posterior tooth is truncate, entire, and the other two lateral teeth but slightly notched. Teeth in lower jaw with a strong horizontal backward process.

Head  $3\frac{2}{3}$  in length; depth 2. Eye 5 in snout. Length of anteorbital groove two-thirds eye. Width of gill slit one-third snout.

Distance from end of dorsal groove to soft dorsal  $2\frac{1}{2}$  in snout. First dorsal spine very heavy, its tip curved backwards, its length one half head; the front and sides of spine are rugose, but not spinous, the rugosities coarser in front and above. Second dorsal spine very slender, two-fifths height of first. No trace of a third spine, the membrane extending almost to posterior end of groove, the length of its base about one-half snout. Second dorsal and anal not falcate, the upper outline straight, the fins becoming uniformly lower posteriorly. Caudal fin slightly convex behind, the tips produced for a distance about equal to diameter of orbit.

Plates very rough, with broken ridges, radiating from base; they are essentially similar in shape on sides of body and head, showing no tendency to coalesce on cheeks. On posterior part of sides are eight raised lines formed of rough median crests on the plates, the crests not bearing distinct spines. Several enlarged plates immediately behind the opercle, each with centrally radiating lines.

Pelvic spine very rough, as well as the membrane immediately behind it.

D. II-32; A. 29. Fifty-two transverse series of plates between base of pectorals and base of caudal. Pectorals with fifteen rays.

Color: Very deep cobalt-blue in life, becoming uniformly black in spirits. A narrow light blue line along bases of dorsal and anal, becoming white in spirits. Caudal with an intramarginal black band, edged posteriorly with a very narrow white line.

This species was found very abundant at Clarion and Socorro Islands, and many specimens were secured.